Wise in One's Own Conceit: The Effect of Direct-to-Consumer Advertising (DTCA) on Consumer's Perceived Medical Knowledge

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ABSTRACT

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Rachel Banton

The pharmaceutical industry uses various marketing tactics directed to both health care professionals and consumers alike. Advertising directly to consumers has proven controversial. Critics argue that direct-to-consumer advertising (DTCA) promotes overmedicalization and unwarranted demand for prescription drugs. This study investigated (1) whether consumers' level of knowledge about a disease or perceived knowledge causes them to seek information from a physician and (2) whether DTCA increases consumers' perceptions of their level of disease knowledge. Results suggest that DTCA has no meaningful impact on perceived knowledge and intention to communicate with the physician. However, consumers' perceived level of knowledge predicted intention to communicate with the physician. These findings have numerous implications for the pharmaceutical industry, regulators and patients alike.

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INTRODUCTION

Pharmaceutical companies are unique enterprises within the global market, making this industry an important one to analyze and understand. The pharmaceutical industry is considered one of the most profitable industries, with an 18.6% return on revenue compared to the next highest industry, commercial banks, at 14.1% (Reinhardt, 2001). Another factor that makes pharmaceuticals an important industry is its financial contribution to the global economy. In 2012, the pharmaceutical industry spent $26.35 billion on promotion (Cegedim Strategic Data, 2012) and in 2007 spent $58.8 billion in R&D (PhRMA, 2009). Equally important is the role that the pharmaceutical industry plays in modern day health care. Physicians write on average 3 billion prescriptions a year (Posey, 2001). That number continues to increase; in 2011, the number of prescriptions rose to 4.02 billion (Science Daily, 2012). In 2008, 74% of patient visits to the physician office were in regards to drug therapy (Center for Disease Control, 2008). In addition to the pharmaceutical industry's importance within the global market, its marketing practices are defined by several key attributes that distinguish it from other industries and make it particularly worthy of study.

The pharmaceutical industry distributes its product to consumers via physicians and this presents unique marketing challenges. This type of marketing is distinct, as pharmaceutical marketers are not always advertising to the end-user of their product. The primary form of marketing used by the pharmaceutical industry remains a push strategy, whereby sales representatives promote products to physicians and offer samples of new products (Buckley, 2004). The majority of the pharmaceutical industry's $25

billion promotional spend goes toward physician detailing (Auton, 2006). In 2005, the pharmaceutical industry employed over 100,000 sales representatives (one for every six practicing physicians) who collectively made on average 6 million visits to physicians that year (Pollack, 2009). In 2003, the U.S. pharmaceutical industry spent more on push marketing than any other form of promotion. During that year, the industry as a whole spent approximately $7.13 billion in detailing and $13.04 billion in sampling costs (IMS Health, 2004).

In order to try to improve their marketing effectiveness, a second form of promotion used by the pharmaceutical industry is a pull strategy. Using DTCA, products are promoted to consumers through various media such as print and television advertisements (Frosch et al., 2007). There are three main types of DTC ads (Gardner, Mintzes & Ostry, 2003). Product claim ads advertise the prescription drug and the disease it treats. Reminder DTC advertisements state the drug name without telling the viewer what diseases or indications the product treats. Finally, help-seeking, or disease awareness ads, inform consumers of new treatments for a disease without specifically mentioning the company's brand of drug developed for that disease. According to the FDA, only product claim ads require risk information, as the latter two forms are not informative enough to require risk disclosure (Mintzes, Barer, Lexchin & Bassett, 2005).

Risk disclosure and other issues have made the use of DTCA by the pharmaceutical industry a contentious one. Certain scandals have only heightened this controversy. For example, in September 2004, Merck & Co. announced that it would be voluntarily withdrawing its $2.5 billion a year grossing COX-2 inhibitor, rofecoxib, from the market. Rofecoxib, or Vioxx, was approved by both Health Canada and the Food and

Drug Administration in 1999 (Green, 2006). By 2004, there was mounting evidence that Vioxx was causing an increase in cardiovascular events in patients taking the drug as a long-term treatment (Sibbald, 2004). After the withdrawal, many pundits and regulators raised concerns over the incident and questioned why it took so long for these side effects to be discovered, particularly when a Merck-sponsored study in 2000 suggested Vioxx may cause an increased risk of cardiovascular events (Green, 2006; Kelly, 2004; Pollack et al., 2009).

The Vioxx incident increased scrutiny over many aspects of the pharmaceutical industry, including its marketing tactics. One such aspect was the pharmaceutical industry's practice of marketing drugs directly to the end-user via DTCA. This practice was put into focus particularly given Vioxx's widespread use, with an estimated 105 million prescriptions written from 1999 to 2004 (Business Wire, 2004). In addition, as Vioxx was a 'me too' drug (a drug to market that is not the first of it's kind in terms of chemical structure or mechanism of action) it should theoretically not have made such a leap in sales, placing it so close to the market leader, Pfizer's Celebrex. Therefore, it has been argued that were it not for intense use of DTCA ($160.8 million compared to Celebrex's $78.3 million DTCA spend in 2000) (Green, 2006), Vioxx's effects would not have been as widespread.

This example demonstrates the interplay between many of the areas which are the focus of this thesis. First, much of the contention surrounding DTCA concerns whether it stimulates unwarranted demand for prescription drugs, what has come to be known as overmedicalization (Mintzes, 2006; Moynihan, Heath & Henry, 2002; Mintzes et al., 2003) The Vioxx situation demonstrates how serious a problem DTCA can pose if it

causes increased prescribing and use of a drug for which there are unforeseen risks (Gardner, et al., 2003). Second, it demonstrates the importance of patient-physician interactions and how important a role this plays in what gets prescribed. For example, individuals who saw DTCA and requested their physician to prescribe a COX-2 inhibitor were more likely to be prescribed that type of medication compared to another nonsteroidal anti-inflammatory drugs (NSAID), particularly for arthritis (Spence et al., 2005).

Second, this example shows that the role the patient plays in the pharmaceutical marketing process cannot be understated. Whether the patient decides to visit the physician, receives a prescription from their physician, complies with the regimen by even going to fill their prescription are all huge filters on whether the drug is actually consumed by the patient and the profit the pharmaceutical industry earns on their promotion dollar. Despite this importance, the current literature on this topic tends to look at the aggregate process of pharmaceutical marketing and ignores the importance of the patient as an independent agent. Therefore, there is a gap in understanding how the micro aspects of the pharmaceutical marketing process function. For example, with the exception of a few recent publications (An, 2007) much less is known about the patient-physician interaction and consumer cognition relating to healthcare advertisements. Even less about how these micro processes relate to the larger picture of concepts such as medicalization and drug request behavior. In order to truly understand how the larger picture works, how it should work and how it should be regulated, there needs to be a better understanding of how consumers are processing drug advertising and how patients interact with their physician in the examination room.

To help close these gaps, this research was undertaken to investigate the relationship among these key variables. Specifically, this research posits that there is a link between medicalization, the patient-physician relationship, DTCA and consumer's cognitive processing of drug advertisements.

RESEARCH OBJECTIVES

The first objective of this research is to explore what influence DTCA may have on consumer's health-related decisions. Currently, there is circumstantial support on each side. Those against DTCA have many concerns about the use of this form of promotion. Imagine a patient is swayed by DTCA to request the newest form of medication to treat their disease. Although the drug is approved, it is relatively new compared with the older, just as efficacious drug that is off-patent and no longer being advertised to the consumer. And as with what happened in Vioxx, there is always the risk that a new drug could have unforeseen risks. Conversely, proponents of DTCA argue that this promotional technique is educational and helps to raise awareness about untreated diseases. To date, no study has conclusively investigated, using an experimental design, the psychological processing of DTCA by the consumer and how this affects consumer behavior.

In addition to shedding light on the DTCA debate for regulatory purposes, determining what is occurring with patients when they process DTCA can help inform the medicalization debate. In a similar vein, there exists a gap within the medicalization literature that needs to be addressed. Much of the medicalization literature simply supposes that DTCA is a mechanism by which overmedicalization occurs without really demonstrating what mechanisms underlie this effect. There seems to be an assumption in this research that patients see an ad and then act upon seeing this information advising them to speak with their doctor. It does not take into account the consumer is an agent in and of themselves. For example, the SOR model (Woodworth, 1928) states that the organism is a mediating variable between the stimulus and response. Rather than ignoring

the consumer's interpretation of incoming information from DTCA, another objective of his thesis is to offer one concrete explanation of the mechanism underlying medicalization. In particular, what about DTCA leads consumers to have a conversation with their physician about the drug or even request the advertised drug?

Another aim of this thesis is to offer information that would help pharmaceutical marketers and regulators alike make better-informed and sounder decisions pertaining to DTCA. For example, if DTCA is promoting overmedicalization by persuading consumers who need not be persuaded to speak with their physician about a new drug, this thesis may be able to show regulators how to approach this issue. If the mechanism by which this is occurring is that consumers do no have enough knowledge to make informed healthcare decisions for themselves, then regulators now have practical information that would indicate that one way to combat this problem is by issuing more and better objective information to the public. The results of this thesis could also help those in the pharmaceutical industry. If the pharmaceutical industry were given information on how consumer's cognitive processing is influencing patients' willingness to speak to their physician about the drug, they would be in possession of a new psychographic variable with which to segment their market and better tailor advertising accordingly.

The final objective of this research is to extend Kruger and Dunning's unskilled/unaware framework in a new context. Kruger and Dunning's (1999) unskilled/unaware hypothesis has not been tested in the healthcare area to date. Therefore, this thesis will be a test of this model's validity in this new context. Additionally, this hypothesis has been largely tested using student samples. If this model holds with a new type of sample, it would enhance the validity of the theory.

RESEARCH QUESTIONS

Given the existing gaps in the literature and the objectives of this research, the following questions are the focus of this thesis:

One of the main questions to be answered by this research deals with whether the cognitive theory dealing with individual's lack of insight into their own knowledge can be applied to a the healthcare domain (Kruger & Dunning, 1999). This research will determine how well the unskilled/unaware hypothesis holds in a knowledge domain in which participants may not necessarily be familiar with. Given these gaps in knowledge about the boundaries of the unskilled/unaware hypothesis, the following question was asked:

Q1: Does one's level of knowledge influence one's level of metacognitive ability within the healthcare domain?

Prior research in the unskilled/unaware area has demonstrated that the link between participant's domain-specific knowledge and metacognitive ability in that domain can be altered through experience. Therefore, it is of interest whether DTCA has an educating effect for consumers or rather causes the consumer to merely feel more confident in their knowledge. In particular, if DTCA is putting certain consumers at a disadvantage then this is evidence that this is one mechanism underlying medicalization. Conversely, if DTCA has a positive or no effect on consumer's drug request behavior, then this thesis could provide some evidence that DTCA's role in overmedicalization has been overstated.

Q2: Does a DTCA intervention cause low-knowledge level consumers to further overstate their level of knowledge or rather make their insight into their own

level of knowledge more accurate?

The third issue addressed in this thesis is whether consumer's insight into their own knowledge can influence their decision to seek information about the drug and potentially request a drug from their physician. Consumer's cognitive processing may influence other areas but tying this to this important variable was essential to make this research practical and relevant. Therefore, the following question was posed:

Q3: Does consumer's metacognitive ability, or understanding of their own knowledge, influence their likelihood to request a drug from their physician?

LITERATURE REVIEW

SOURCES OF HEALTH KNOWLEDGE

Consumers derive health knowledge from a multitude of sources. More so than ever before, consumers are playing a more active role in their own healthcare and seek out information from these sources. For example, those conducting information searches about health concerns has risen from 38% of American adults in 2001 to 56% in 2007 (HSC Community Tracking Study Household Survey, 2007). Consumers report seeking health information from print (books, magazines, newspapers), friends and relatives, the internet and, least often, from television and radio (HSC Community Tracking Study Household Survey, 2007). The use of the internet as a health information resources has doubled from 2001 (16%) to 2007 (32%) (HSC Community Tracking Study Household Survey, 2007).

As this data suggests, consumers seek out health information from many sources. But what types of individuals are seeking out health information and how are they using it? A survey conducted by Fox and Fallows (2003) for *Pew Internet and American Life* found that there are three main clusters of consumers who actively seek health information. The first group is those who search for health information on behalf of others. This group is mainly composed of healthy women aged 30-49 years old who are seeking information on behalf of their children. The next category is individuals with chronic illness or disability. Eighty-seven percent of this group has searched the internet

at least once regarding health concerns. Similarly, the final group is composed of those who are caregivers for individuals with chronic illness or disability.

Stemming from consumers growing use of health resources, a new area of research has emerged. Consumer health informatics is based on the principle that the more health information is readily available to the consumer the better as this improves consumers' knowledge and decision-making capabilities (Eysenbach, 2000). However, despite the increasing consumption of health-related knowledge, evidence exists that access to information may not always yield better informed patients able to make better health choices.

Keselman et al. (2008) conducted a study in which they asked participants to make a diagnosis given a list of symptoms using the internet as their source of information. The researchers grouped participants search strategies into three categories: 'verification first', 'problem area first' and 'bottom up'. The participants who fell into the 'verification first' strategy initiated their search by having a diagnosis in mind. They then sought out information to either confirm or refute their original theory. However, subjects in this group often committed errors such as confirmation bias and prematurely discontinuing their search as soon as they erroneously believed they had found confirmation of their hypothesis. Participants using the 'problem area' strategy of beginning the search with a diagnostic category in mind often did not have enough pre requisite domain knowledge to navigate their way through information they discovered. For example, they would skip over a subcategory and would end up without any conclusion. Participants using a 'bottom up' strategy suffered from the same issue of not having the requisite knowledge. Participants would fail to account for all symptoms given

to them. For example, subjects would often disregard information they would not typically associate with cardiac issues (ex: nausea) and then search out a diagnosis that conformed to the symptoms as they perceived them.

Should a consumer make an incorrect diagnosis of symptoms they may be experiencing, they could have this clarified upon a visit to their physician. However, 35% of individuals seeking out health information online never confirm their findings with a physician (*Pew Internet Project Report: Online Health Search* as cited in Keselman et al., 2008).

The easy access to educational health information can be useful in certain cases where it helps inform the patient. However, there are risks to consider. As can be seen from Keselman et al. (2008), there is the potential that increased patient access to information can lead to the consumer drawing erroneous conclusions about theirs, or another's, health.

Increased focus on health in combination with easy access to health information has in part fueled the debate over what the appropriate level of medicalization should be to find a balance between educating patients and ensuring they are on the correct path.

MEDICALIZATION

Medicalization as a Form of Social Control

The notion of medicalization first developed within sociology as a hypothesized means of social control. Parsons (1951) was the first to talk about the 'sick role' and how labeling behavior as an illness could be used as a form of social control over others. This model

states that there are certain expectations a sick individual takes on once they are labeled as such. It is expected that society will not blame the individual for being sick and this person is not expected to be able to cure himself or herself with resolve alone, nor are they expected to always be cured via help from other non-sick individuals. Furthermore, the sick person is exempted from social, work and family obligations. However, in addition to exemptions, the sick person also has obligations to define his being sick as negative and must actively want to and participate in getting better (Fox, 1977).

Later in the 1970's, researchers began building upon Parson's research of the 'sick role' by investigating which social behaviors deemed by society as negative have been medicalized and which ones remained bad behavior caused by the individual themselves. Some examples of conditions researched that were deemed medicalized include hyperactivity in children (Conrad, 1975), mental illness (Scull, 1975), child abuse (Pfohl, 1977) and alcoholism (Schneider, 1978).

Eliot Freidson and Irving Zola also viewed medicalization as a sociological issue. Like researchers before them, they both emphasized the social control aspect of medicalization. They argued that the rise in secularization and humanistic ideology are both responsible for medicalization (Davis, 2006). Following them, Fox (1977) proposed that deviant behavior is dealt with by society in a fairly consistent way across civilizations over time. He noted that the evolution of how deviant behavior is construed depends on the level of secularization within a society. First, deviant behavior starts as being labeled sinful and is to be dealt with by the church. Then, as society grows less religious but still clings to some religious ideology, deviant behavior turns criminal, to be dealt with by the state. Finally, with increasing focus on science, analytical thinking and

increasing secularization, criminal behavior is once again re-labeled and becomes perceived as a form of illness to be dealt with by the medical community.

Although sociology is where the notion of medicalization originated, it has evolved over time. The term is still used to indicate the change of a behavior from being interpreted as a typical occurrence, to being labeled as a medical condition. However, rather than always carrying a negative connotation as a form of control over the population, medicalization now refers to how society as a whole, the medical community and the pharmaceutical industry now interpret the boundaries of illness and disease.

Modern-day Medicalization

Mirriam-Webster defines medicalization as 'to view or treat as a medical concern, problem or disorder'. The general idea of medicalization has not changed dramatically since its conception in the 1950's. What has changed, most would argue, is where the boundary between health and sickness lies. The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (WHO, October 2011). As an authority on health, the WHO's definition is important and reflects what many authors argue is a general societal trend to construe more and more of what used to be considered 'normal' into illness or disease (Brennan, Eagle & Rice, 2010; Davis, 2006).

At issue is determining the cause of this narrowing definition of health. Poitras and Meredith (2009) make the distinction between two forms of medicalization: social and economic. Social medicalization is still interpreted as a way of gaining power (Poitras & Meredith, 2009). Brennan et al. (2010) discuss certain social phenomena and actors that

may contribute to medicalization. The theory of medical imperialism states the medical community actively seeks to medicalize previously normal behavior in order to gain power. Political forces can also play a role in medicalization. Advocacy groups can actively petition for something to be medicalized in order to gain power for those diagnosed with the illness. For example, patient advocacy groups played a large role in having post-traumatic stress disorder labeled as such (Brennan et al., 2010). Technological advances can also play a role in the increase of medicalization in society. Better technology is now available to diagnose diseases earlier, or detect symptoms that may not have been traceable before. Advances in statistics now allow for a better understanding of potential risk factors for disease and thus, an illness may be treated based on risk-factors even before a disease arises. Demographic factors also play a possible role. In North America, baby boomers are aging, and thus there is a large segment of the population seeking medical solutions that previous generations never considered as falling under the purview of medicine.

Economic medicalization is the transformation of non-medical problems into medical ones to the benefit of pharmaceutical companies (Poitras & Meredith, 2009). Overmedicalization stems from a multitude of factors including social trends, pharmaceutical industry factors and mass media medical reporting (Brennan et al., 2010). However economic medicalization and the pharmaceutical industry's use of DTCA have been particularly blamed for increases in medicalization and inappropriate demand for prescription medications (Healy, 2004; Poitras & Meredith, 2009; Pollack et al., 2009).

DIRECT-TO-CONSUMER ADVERTISING

The Rise of Direct-to-Consumer Advertising

How did the marketing of pharmaceuticals reach the point it is at today? Why are certain stakeholders concerned about the presence of DTCA as a marketing tool in the pharmaceutical industry? Understanding the case of the evolution of DTCA in the United States is of particular importance for several reasons. First, it is one of the few countries where all forms of DTCA are permitted (Frosch et al., 2007). Furthermore, U.S. markets make up approximately 48% of global pharmaceutical sales (Auton, 2006). Understanding the evolution of DTCA within this market will make clear DTCA policy initiatives that have already taken place and what might be the correct path moving forward in light of the results of this research.

In 1962, the United States Congress granted the Food and Drug Administration (FDA) authority to regulate pharmaceutical marketing (Aikin et al. as cited in Boden & Diamond, 2008). Then, in 1969, the FDA passed regulation stating that pharmaceutical advertising must present a 'fair and balanced' assessment of the risks and benefits of the advertised drug (Boden & Diamond, 2008). In the 1980s spending on DTCA industry-wide was only about $12 million (Deshpande et al. 2004; Palumbo & Mullins, 2002). DTCA as we know it today got its start in the United States in 1997. It was then that the FDA passed regulation facilitating the pharmaceutical industry's use of DTCA on television (Auton, 2006). Specifically, the FDA reinterpreted its existing regulations and changed how risk information was to be presented. Prior, all drug side effect information had to be reported but this reinterpretation allowed the amount of risk information to be proportional to the amount of benefits the drug listed in the advertisement, or what has

been dubbed a 'fair balance' between benefits and risks of the drug (Terzian, 1999). This new interpretation made televised DTCA much more feasible.

The situation in Canada has been somewhat different from that of the U.S. Direct to consumer advertising is technically illegal in Canada under the *Foods and Drug Act* (Mintzes, 2006). However, in 1978, an amendment to the act was passed stating that the name and price of Schedule F drugs can be advertised (Mintzes, 2006). In 1996 a policy paper was issued by Health Canada which clarified the *Foods and Drugs Act.* This memo defined what is considered advertising (Mintzes, 2006). The clause stated that advertising's primary purpose is to promote sales. Together, this clarification in 1996 and amendment in 1978 has allowed many pharmaceutical companies and their advertising agencies to expand DTCA further than before should they so choose. This has resulted in two accepted forms of DTCA in Canada: educational, disease-awareness DTCA and reminder ads, where only the brand is mentioned (Mintzes, 2006).

Direct-to-Consumer Advertising's Effectiveness

The pharmaceutical industry continues to use DTCA because it is effective in its current form; otherwise, logically, spending on this promotional tool would not continue. In fact, investment in DTCA continues to grow. Since changes in FDA regulation have taken effect, the amount spent on DTCA has risen from 9% to 16% of total promotion spend (Morgan, 2007). In 2000, industry spend on DTCA was $2.47 billion compared to $1.07 billion in 1997 (Zachary, Dalen & Jackson, 2003; Rosenthal et al., 2002). In Canada, industry spending on DTCA was $22 million in 2006 compared to $2 million in 1999 (Mintzes, Morgan & Wright, 2009).

Aside from investment indicators of effectiveness, how do we know DTCA influences consumers? First, it is effectively reaching consumers. Indeed, the average American views sixteen hours of televised DTCA per year (Brownfield et al., 2004). In 2000, it is estimated that 100 million consumers sought further information after seeing DTCA, 53 million individuals consulted their physician about a drug they had seen advertised and 12.1 million patients received the drug they requested from their physician (Holmer, 2001).

Finally, financial data shows DTCA impacts revenues. DTCA positively affects important measures such as brand share and particularly category sales (Wosinska, 2002; Narayanan, et al., 2004). In terms of ROI, the median return on investment (ROI) for every DTCA dollar spent is two dollars, with the greatest return being $6.5 on the dollar. In addition, between 1998 and 2003, 75% of drug brands that utilized DTCA as a marketing technique had positive ROI at or above $1.50 per dollar invested and 35% having a $2.50 return (Gascoigne, 2004).

Given the overall effectiveness that DTCA has on sales, some have questioned whether DTCA is providing an overall benefit to patients or rather biased information used solely to promote. There is heightened concern about bias in this form of advertising is particularly acute compared to other industries. As Frosch et al. (2007) states: "Poor judgment among soap brands may have few health consequences; DTCA's influence on drug preferences…is a much more substantial concern for health care expenditures and population health." (p 12).

Arguments For and Against DTCA

DTCA has proven to be a very controversial form of advertising. Researchers, media, academics, government, the pharmaceutical industry and other key stakeholders have presented data and arguments supporting their views of what they believe should ultimately happen with DTCA. Attitudes toward DTCA are indeed quite polarized (Auton, 2006), however there are those who advocate a compromise and argue for the middle ground.

Arguments for Direct-to-Consumer Advertising

"After completing a thorough review of Direct-to-Consumer (DTC) prescription drug advertising, the National Health Council believes that DTCA advertising is an effective tool for educating consumers and patients about health conditions and possible treatments" (National Health Council, 2002a, b as cited in Calfee, 2002).

One of the main arguments put forward by proponents of DTCA is one that focuses, rightly so, on the patient. Patient empowerment, the right of the patient to actively participate in their own healthcare, is advocated by many (Stolberg, 2000; Anderson et al., 1995; Funnell, et al., 1991). Advertising in general provides information to consumers about a product and puts the purchase decision in their hands. Consumer empowerment is particularly important in pharmaceutical advertising as patients are not as informed as physicians (Calfee, 2002) and there are many diseases which are under-diagnosed and under-treated such as depression (Glick et al., 2001), AIDS (Fleming et al., 2002), diabetes (Leape, 1995) and osteoporosis (Nguyen, Center & Eisman, 2004).

Advocates for DTCA also maintain that restricting consumer's access to health

information implies the consumer is not intellectually equipped to participate in their own healthcare. Pro-DTCA individuals argue this is simply not the case and that patients are becoming active participants in their healthcare and are developing a high level of knowledge about medical issues (Singh & Smith, 2005).

Pro-DTCA individuals have cited evidence to back up their claim that patients are more than competent enough to receive health information via DTCA. Risk information is more important to consumers than benefits (Deshpande et al., 2004). A consumer survey released in 1999 by the FDA (as cited in Calfee, 2002) found that if a specific drug concerned them, 85% of consumers reported that they would read all or almost all information provided on a DTC ad for that drug (Calfee, 2002). A 2000 survey conducted by Prevention Magazine (as cited in Calfee, 2002), found that 37% of consumers report skimming the risk information summary presented in print DTCA (Calfee, 2002).

An additional argument to support patient empowerment is that consumers may be more critical and skeptical of DTCA than opponents of DTCA give them credit for. Data from the *Prevention* survey found that risk information made 36% of respondents less confident about taking the medication compared to 24% who felt more confident and 34% who reported risk information as making no difference to them. In addition, a 1999 FDA study found that 59% of consumers recognized there should be more risk information contained in DTCA, while only 49% stated there should be more information about drug benefits (Calfee, 2002). Echoing these surveys, Spake and Joseph (2007) found that 49% of consumers believe their doctors prescribing choices are influenced by the pharmaceutical industry, 69.5% of people believe that more DTCA regulation is needed and only 5.8% believe that the FDA properly regulates drugs. This evidence

suggests that consumers are critical enough of pharmaceutical advertising to quell critics' concerns (Calfee, 2002).

In addition to providing consumers with an additional source of health education, proponents of DTCA argue that it allows patients to improve the dialogue and relationship with their physician. For example, approximately 75% to 81% of patients ask more specific questions to their physician during their next visit after seeing DTCA (Advanced Analytics Inc., 2004 as cited in Auton, 2006; FDA, 1999 as cited in Calfee, 2002). Welch, Cline and Young (2005) argue that DTCA does not alter the patient-physician relationship in a negative way. Rather, DTCA encourages patients to make drug inquiries to their physician without taking away relational control from the physician. Ninety-three percent of patients report that physicians welcome their questions ad 83% report their physician reacted to their questions as a normal part of their visit (FDA, 1999 as cited in Calfee, 2002).

Those in favor of DTCA argue that it does not inflate the cost of prescription drugs as critics have claimed. Rather, the retail price of drugs reflects how valued the product is to consumers, physicians and insurance payers (Rosenthal et al., 2002). In addition, some argue that advertising in general will decrease the cost of the item because advertising increases competition between brands (Calfee, 1997). Furthermore, research has demonstrated that there exists no correlation between the amount of DTC advertising and the cost of prescription drugs (Manning & Keith, 2001).

Fourth, supporters of DTCA argue against claims that while DTCA may not cause inflated drug costs, it most certainly increases prescription volume. Research has shown that there is no connection between the amount spent on DTCA and the percentage

increase in sales of these drugs (Manning & Keith, 2001; Calfee, Winston & Stempski, 2002).

An added benefit of DTCA, proponents argue, is that DTCA causes individuals to focus more on their health in general rather than solely on prescription drug solutions to their medical problems (Calfee, 2002). Fifty-three percent of patients who approached their physician after seeing a DTC ad reported their doctor mentioned a non-drug therapy. Pharmaceutical companies are also beginning to stress a holistic approach to healthcare in addition to promoting pharmaceutical therapies. As part of their 'More than Medication' initiative, Pfizer recently released a phone application, Smidge, which aims to help consumers improve their overall health by helping them develop healthy habits (Pfizer news release, 2012).

Overall, proponents of DTCA focus on its educational value, its ability to improve the patient-physician dialogue and refute claims that it increases unwarranted prescribing.

Arguments Against Direct-to-Consumer Advertising

Many arguments have been leveled against the pharmaceutical industry's use of DTCA. The main rationalization behind those who are against DTCA is that the money could be better spent on advertising about health issues that promote the long-term health of society rather than indirectly funding prescription drug advertising that promotes the pharmaceutical industry's agenda (Almasi et al., 2006; Avron, 2003).

Most critics point out that DTCA cannot be framed as a form of health education. Bell et al. (2000) systematically addressed this question by performing a content analysis of DTCA. They found that information commonly found in DTC ads are the condition

name and a few symptoms. They argue that this amount of information alone cannot be considered as providing educational value. In addition, even if DTCA is educational to some extent, its benefits will end once DTCA for a particular condition is no longer profitable for the pharmaceutical company doing the advertising (Almasi et al., 2006). Along similar lines, some research has questioned how DTCA can truly be informative and unbiased in its assessment of its product when the point of advertising is to persuade the consumer and sell a product (Poitras & Meredith, 2009). Finally, consumers may believe they are being informed through the information provided in DTCA and this may actually reduce their motivation to seek additional information about a disease or drug elsewhere (Almasi et al., 2006).

Another argument put forward against DTCA is that it does not present a fair assessment of the potential risks associated with the advertised drug (Herzenstein, Misra & Posavac, 2004). Critics argue that advertising backed by a profit-motive simply cannot be educational (Finlayson & Mullner, 2005). In an analysis of a DTC ad for Johnson & Johnson's Cypher™, a sirolimus-coated stent, Boden and Diamond (2008) found that the number of possible adverse events presented in the ad was five compared to fifteen listed on the company's website and 44 listed in a patient-education brochure about stents. Importantly, the ad did not mention the possible side effect of death, which is mentioned both on the website and brochure.

A third argument critics put forward against DTCA is its use of emotional appeals. Frosch et al. (2007) performed a content analysis of DTC ads presented during prime time television in order to determine the types of advertising appeals used. The researchers found that the ads presented incomplete symptom and prevalence information

while relying mainly on positive emotional appeals of regaining control of one's life and gaining social approval. The authors argue that the use of these strong emotional appeals may cause consumers to disregard the little risk information that is presented within the ad. What effect might this have? Individuals who use DTCA as a reason to speak with their physician may be doing so based on positive emotional appeals and not for rational reasons. This argument is critical when one considers that people who take DTCA information they found to their doctor are more likely to be poor, less likely to be healthy and more likely to see their physician regularly (Murray et al., 2004). In addition, those who received the medication they saw in a DTC ad were more likely to have low levels of education, income and not be pro-active in seeking health information (Murray et al., 2004).

Additionally, those against DTCA argue that DTCA does in fact interfere with the doctor-patient relationship. First, physicians do not appear to be in favor of DTCA. Survey results show that four out of five family physicians are not in favor of DTCA (Lipsky & Taylor, 1997; Mintzes et al., 2005). Kravitz (2000) illustrates the dilemma physicians face when DTCA enters into the examination room. It is entirely possible that DTCA acts as a springboard for correct diagnosis even if what the patient thinks she has is not indeed the correct diagnosis. Alternatively, if DTCA leads patients to come visit their doctor with a diagnosis and treatment plan already in hand and the physician is more concerned about patient satisfaction than correct treatment, this may lead to disastrous results. Additionally, physicians may be time crunched when they see patients and may therefore be overly receptive to what the patient believes their problem to be rather than relying on their own expertise (Pollack et al., 2009).

In terms of health care costs, Poitras and Meredith (2009) argue that DTCA increases health care costs by increasing both prescribing volume and drug costs. Pharmaceuticals are one of the fastest growing costs of health care, increasing 15% per year (Angell, 2004). A congressional report showed that DTCA does in fact increase drug sales (Gottlieb, 2002). Indeed, in a survey asking health care payers, providers, patient groups, advertisers and pharmaceutical representatives whether they believed DTCA will increase the cost of prescription drugs, 80% responded yes, regardless of what industry they were in (Mintzes, Barer, Lexchin & Bassett, 2005).

Contrary to DTCA advocates, critics argue consumers do not have the requisite knowledge and are not equipped to make medical decisions and could therefore be creating inappropriate demand for prescription drugs (Spake & Joseph, 2007). The average consumer is not trained in medicine and should not be expected to understand the implications and risks of seeking out one particular drug, treatment regimen or drug brand over another (Almasi et al., 2006). For example, Hoek and Grendall (2003) found that consumers have high recall for drug information reported in DTCA but much lower recall (20%) for risk information presented. In that study, 60% of respondents reported being confused about the risk/benefit information after viewing DTCA.

Arguments for Regulation Revision of Direct-to-Consumer Advertising

"DTCA is neither good nor evil; it is both." (Kravitz in Almasi et al., 2006 p0285). Although many actors within the DTCA debate are firmly convinced of its inherent shortcomings or virtues, some take a more balanced view. Richard Kravitz argues that DTCA plays a role in healthcare but must be regulated in order for the public to receive

the maximum benefit (Almasi et al., 2006).

Individuals in this camp favor a balance between the pharmaceutical industry's innovation and First Amendment rights with the public's need for protection against misleading advertising and inflated drug costs (Chin, 2005). Some acknowledge that DTCA may cause over prescribing of prescription drugs but also acknowledge that there is under-treatment and low awareness of certain medical issues (Almasi et al., 2006). Kravitz et al. (2005) investigated the issue of the potential for inappropriate prescribing based on patient requests stemming from DTCA. Antidepressants are one of the most heavily advertised drug categories. Kravitz and colleagues sent a confederate to various physicians while manipulating symptoms and request type. The symptoms presented were either suggestive of a diagnosis of adjustment disorder or major depression. The type of request was either for a branded medication, a general request for any medication or no request. They measured whether the physician wrote a prescription for the branded drug, any prescription drug or did not write a prescription. Results showed that while prescribing for adjustment disorder was lower than prescribing for the major depressive condition, branded drug requests seem to make more of a difference in prescribing for adjustment disorder. The branded drug in this study, Paxil, was prescribed in two thirds of cases where the confederate specifically requested Paxil and presented with adjustment disorder. Those presenting with major depression who made a drug request received a prescription 88% of the time, whereas those who did not received a prescription only 65% of the time; a 23% difference. In comparison, physicians in the adjustment disorder condition prescribed medication 50% of the time, compared to 18% prescribing rate for those cases where the confederate made no request. That is a 32% difference.

Furthermore, general drug requests were just as effective at getting a prescription as branded drug requests. Importantly, there is no data to support prescribing antidepressants in adjustment disorder; but as based this study suggests, there is evidence that there may be widespread inappropriate prescribing for this condition when patients request any sort of medication for their symptoms during their visit. Overall, Kravitz argues that DTCA is beneficial for serious medical conditions and for those that need attention brought to them. However, drug inquiries stemming from DTCA for conditions that are not clearly defined may lead to inappropriate prescribing (Almasi et al., 2006).

Consumer Attitudes and Behaviors toward Direct-to-Consumer Advertising

To obtain a more complete picture, one must also consider the consumer. How do they view DTCA and what are their attitudes toward it?

Consumers' attitudes toward an ad are a commonly studied variable that is defined as consumer's degree of favorableness or unfavorableness toward a given ad. Attitudes and consumer's resulting behavior are intimately linked in the domain of advertising. The attitudes one holds toward a given advertisement has been linked to ones attitudes toward the brand and ultimately purchase intentions (MacKenzie & Lutz, 1989; MacKenzie, Lutz & Belch, 1986).

Consumer Attitudes Toward DTCA

Research to date investigating the effects of DTCA from the consumer perspective has focused heavily on consumer attitudes and other antecedents of behavioral outcomes related to health care. This section will explore consumer's attitudes toward their health, the pharmaceutical industry and specifically DTCA.

In general, consumers hold positive (Murray et al., 2004; Deshpande, 2004) to neutral (Wilkes, Bell & Kravitz, 2000) attitudes toward DTCA. In a study by the FDA conducted in 1999, respondents were in favor of seeing DTC ads at a ratio of two to one (Calfee, 2002). Consumers recognize that DTCA is an information tool. Eighty-six percent of participants surveyed by the FDA reported that DTCA helps them increase their awareness of new drugs. About 40% of consumers report that they factor DTCA into their medical decisions (Deshpande et al., 2004) whereas the 1999 FDA results show that only 47% on respondents agree that DTCA helps them make better informed decisions about their health (Calfee, 2002). However, 75% of FDA respondents stated that DTCA helps them have better discussions with their physician.

Consumer Behavioral Response to DTCA

DTCA is the catalyst of many patient behaviors. For example, DTCA can lead the consumer to seek more information about a condition (Liu, Doucette, Faris & Nayakankuppam, 2005; Sumpradit, Fors & McCormick, 2002; Doucette & Schommer, 1998) and it is widely accepted that DTCA can motivate individuals to visit their physician (Lehrer et al., 2000; Slaughter & Schumacher, 2001; Weissman et al., 2003) and even request a drug from their physician (Peyrot, Alperstein, Van Doren & Poli,

1998).

Certain demographic and health related factors increase DTCA's influence on consumer's subsequent behavior. For example, low socioeconomic status, illness (Murray et al., 2004) and gender (Bell et al., 2000) all play a role in the net effect DTCA has on consumer behavior.

In addition to demographic factors, certain attitudinal variables also impact the effect DTCA will have on the consumer. Herzenstein et al. (2004) analyzed secondary data collected by the FDA. They investigated whether consumer's general attitudes toward DTCA result in behavioral consequences such as searching for additional information, asking a physician about the drug and the likelihood of receiving a prescription. Holding positive attitudes resulted in a higher likelihood of consumers searching for additional information about the advertised drug and asking their physician about the drug. Interestingly, results also showed that consumers' positive attitudes increased the chances of them asking their physician about the drug and also receiving a prescription. Similarly, Spake and Joseph (2007) surveyed consumers and found that believing DTCA is informative and adequately reports side effects predicted consumers' willingness to meet with a physician and request the advertised medication.

Although there is a growing understanding of consumer's attitudes and behaviors toward DTCA, there exists a gap in this literature on consumer's cognitive processing of the information they are presented within DTCA and how this may impact consumer behavior.

BIASES IN SELF-PERCEPTION AND BEHAVIORAL PREDICTION

Social science researchers have been studying an enigma seemingly inherent to the human species for many decades. This enigma, simply put, is that people are reasonably good at assessing the skills and performance of others yet self-assessment seems exponentially more difficult. Individual's perceptions of their own skills and abilities only ever correlate weakly with objective performance measures (Ehrlinger et al., 2008). Adolescent men's' confidence in their knowledge about condom use correlates very weakly with their objective level of knowledge (Crosby & Yarber, 2001). In the health domain, even physicians in a domain they should be highly familiar with fail to accurately assess their own knowledge on the topic (Tracey et al., 1997). Finally, in a meta-analysis of the correlation between objective ability and perceived ability, Mabe and West (1982) found a .29 correlation between the two variables. Although this level of correlation is far from perfect, there very rarely is a perfect correlation. However, when considering how much more accurately people are able to assess the abilities and strengths of others, this weak correlation becomes surprising. Individuals are much more accurate at predicting the behavior of others. For example, surgical resident's self-assessment of their behavior does not predict their performance on their board exams, but their peer's assessment does (Risucci, Tortolani & Ward, 1989).

How can this paradox be explained? What are the causes of individuals' less than stellar ability to judge their abilities in both social and cognitive domains? Why are perceptions about other's abilities so much more accurate? This manuscript will focus on several factors that contribute to this bias in judgment.

Unrealistic Optimism

Individuals are overly optimistic in many areas of life. Within the psychological literature, this phenomenon has been termed 'unrealistic optimism' and may be one of the underlying causes of people's inability to accurately assess their own skills and abilities.

Unrealistic optimism is pervasive particularly within the health domain. Weinstein (1987) conducted a survey investigating the degree to which respondents believed they were at risk of 32 health-related problems including, for example, the probability of developing a drinking problem, gallstones, diabetes, stroke, cancer, etc. Participants were asked to rate the likelihood of falling victim to these hazards compared to others their age. Results showed that across age, sex, education and occupation categories, respondents systematically underestimated the probability of having a negative health event happen to them. This bias also results in negative behavioral outcomes. For example, people believe themselves to be less prone to catching the flu than the average person and therefore are less likely to get a flu shot (Larwood, 1978).

There are many components to individuals' unrealistic optimism. In addition to believing they are less at risk for negative events, people also believe the probability that they will experience positive life events is high.

Another behavioral consequence of unrealistic optimism is it also causes individuals not only to look on the bright side, but to be overconfident in those often inaccurate judgments and predictions. Indeed, when a group of physicians diagnosed patients as having pneumonia, predictions that were made with 88% confidence were only correct 20% of the time (Christensen-Szalanski & Bushyhead, 1981).

The Above-Average Effect

One type of self-serving assessment deals with how individuals assess their own abilities relative to their peers. The above-average effect occurs when individuals believe themselves to be above average in most areas of life, which is of course mathematically impossible (Alicke & Govorun, 2005).

On the whole, it is quite common for individuals to make self-serving appraisals of their performance across many domains. It is hypothesized that such self-serving assessments are indeed adaptive and are in place to preserve one's sense of self-esteem. The lack of these biased self-assessments are associated with feelings of helplessness and depression (Alloy & Ahrens, 1987; Taylor & Brown, 1988).

These types of self-serving biases are facilitated by the lack of objective standards for many classes of behavior (Dunning, Meyerowitz & Holzberg, 1989). Lacking these, individuals are free to pick and choose those criteria, which put them in the top ranks of a given skill set. It is an open question whether the preservation of self-esteem, is caused by discounting evidence that goes contrary to non-desired outcomes (Gilovich, 1983; Kunda, 1987, Lord, Lepper & Ross, 1979), or on the availability heuristic (Tversky & Kahneman, 1974). Either way, it has been shown experimentally that individuals often select attributes of a quality that are most in line with their strengths and disregard other characteristics of that quality which may lower perceptions of their ability (Weinstein & Lachendro, 1982). When an individual has to use a static set of criteria to judge their capabilities compared to others, overestimation of their ability drops dramatically (Dunning et al., 1989).

Base Rate vs. Dispositional/Case-Based Judgments: Predicting Behaviour

In addition to inaccurate self-perceptions of ability, individuals also poorly predict their own future behavior. People typically focus on case-based, or dispositional information, and disregard distributive, or base-rate information, when performing self-assessments. In contrast, people are less biased when assessing others and because they use both types of information, resulting in a more accurate judgment (Kahneman & Tversky, 1979; Epley & Dunning, 2006).

In addition to largely failing at predictive judgments due to utilizing the incorrect information as with self-perceptions, individuals tend to be overconfident in those behavioral judgments as well. Dunning, Griffin, Milojkovic and Ross (1990) investigated this issue by asking participants in their study to make predictions as to an individual's future behavior in a given situation and varying the level target subjects were individuated. Importantly, they found that the more a subject's predictions went against the base rate for the behavior in question, the more often subjects are wrong in their prediction and the more overconfident they are. The authors show that people are more overconfident when they base their prediction on dispositional or case-based information and are actually slightly underconfident when predicting in the same direction as base-rates would indicate the behavioral outcome is likely to be.

METACOGNITION

One avenue open for investigating how consumers' cognition relates to DTCA is assessing their level of metacognitive ability. Individuals who lack knowledge and expertise in a given area are at a disadvantage when making self-assessments. In addition to being overly optimistic, they also lack the ability to know how poorly they are performing at the task. In order for an individual to know they are performing poorly, they must have at least some basic knowledge of the area in order to recognize their incompetence. The term for this skill, the ability to monitor one's own thinking and knowledge processing is called metacognition. Metacognition can be defined in many ways. For the purposes of this thesis, metacognition will be defined as the ability to think about one's own cognitive processing (Flavell, 1979). To illustrate this definition, it is helpful to review the work by one of the pioneers of metacognition. In a study comparing the metacognitive ability of preschool and elementary school children, Flavell, Friedrichs and Hoyt (1970), asked children to study a set of items until they were positive they would be able to recall the items perfectly. Older children were typically ready for the recall task once they said their study of the items was complete. However, the younger preschool age children usually were not ready for the recall task when they reported they had completely memorized the list of items. The implication here is that older children are better able to monitor the state of their own knowledge and understanding and thus would be categorized as having superior metacognitive ability than younger children.

Research has demonstrated that all individuals, regardless of age or ability, lack self-insight to some degree and find it difficult to produce accurate self-assessments.

However, those with low knowledge in a given domain seem particularly at risk of producing self-assessments that do not coincide with reality (Ehrlinger et al., 2008; Kruger & Dunning, 1999).

Consumer's Metacognitive Ability and DTCA

In addition to investigating consumer's attitudes and behaviors stemming from DTCA, a few researchers investigating consumer behavior in relation to DTCA have demonstrated some interesting findings related to human cognition, specifically the role of the consumer's perceived knowledge.

Maddox and Katsanis (1997) surveyed consumers to determine how DTCA impacts the patient-physician relationship. They found that whether subjects were told the source of information about a new drug was DTCA or a physician had no effect willingness to seek additional information about the drug. In addition, the authors found that while consumers have little worry about discussing a prescription drug they have seen advertised, those who have seen DTCA are less likely to have discussions about, and seek out information regarding, advertised drugs. The authors suggest that DTCA may be inadvertently increasing consumer's confidence in their knowledge and thus do not feel the need to retrieve new information.

Hoek and Maubach (2007) conducted a survey of New Zealand consumers to determine whether DTCA has the educational effect proponents argue it has. The authors investigated whether DTCA merely bolsters feelings of self-efficacy among consumers. The authors predicted that if DTCA were serving an educational function, consumers with little medical knowledge would be more likely to appreciate the information and

therefore view DTCA more positively than consumers with high levels of medical knowledge. Based on their findings, the authors suggest that rather than educating or motivating consumers to seek more information, DTCA may just be bolstering the self-efficacy among those with insufficient medical knowledge.

Much research has investigated how attitudes toward DTCA influence consumer's interaction with their physician. Results have been mixed with some research concluding positive attitudes have little to do with drug inquiry intentions (Perri & Dickson, 1988; Williams & Hensel, 1995) while others find a positive relationship (Deshpande, et al., 2004; Herzenstein et al., 2005; Peyrot et al., 1998; Singh & Smith, 2005). An (2007) attempted to reconcile these conflicting findings by proposing consumer's perceived knowledge as a moderator. The investigation entailed determining how consumer's attitude toward DTCA and perceived knowledge of medical issues influenced their intention to ask or insist their physician prescribe them a medication. Respondents were sampled by phone and were asked their general attitudes toward DTCA, how knowledgeable they feel themselves to be about health and medicine and how likely they would be to request a drug or insist on a prescription for a specific drug from their physician. Results indicate that consumer's perceived health knowledge significantly bolsters the relationship between attitude toward DTCA and drug inquiry intentions.

An's (2007) study lays the groundwork for further inquiry into how consumers cognitive processes, particularly their understanding of their own knowledge, relates to DTCA and the patient-physician relationship. However, there are some areas in which this research could be improved upon. Methodologically, An's measure of consumer's concept of their own knowledge of medical issues is a single item which has not been

validated in other research. Second, the study is unable to parse whether actual or perceived health knowledge influences drug inquiry intentions. Conceptually, what An is referring to in her research as 'perceived knowledge' can be better categorized under an existing branch of literature within the domains of cognitive psychology and cognitive neuroscience known as metacognition, discussed above.

THE UNSKILLED/UNAWARE HYPOTHESIS

To determine whether one's level of knowledge and metacognitive ability can cause inaccurate self-assessment, Kruger and Dunning (1999) investigated whether accuracy of self-assessment varies across individuals for given domains based on their level of metacognitive ability. Answering this question, they argue, sheds light on why individuals who are unskilled within an area are also the worst at evaluating their own performance. Kruger and Dunning (1999) demonstrate across a variety of tasks that participants who score in the bottom quartile of ability within a domain consistently and drastically overestimate how well they scored on an objective test compared to those who score in the top half of the distribution. They also demonstrate that this is likely due to insufficient metacognitive skills these participants have within that domain. The author's operationalized metacognitive skill as the ability to recognize competence within a domain, be in the participants or another individuals. They demonstrate this effect and are also able to reverse it. As predicted, when subjects were taught the basic knowledge required to become proficient within a domain, their metacognitive ability and accuracy of self-assessment improved as well.

Kruger & Dunning's (1999) results have sparked debate about why those who lack skills consistently assess their performance inaccurately. Some have argued that Kruger & Dunning's (1999) pattern of results could be explained due to regression to the mean and the unreliability of measures assessing participants' objective level of performance. Krueger and Mueller (2002) argue that these two factors reduce the strength of the correlation between objective and perceived task performance. In addition, others have argued that using a comparative measure to assess participant's perceived performance is not reliable, as everyone finds comparative judgment difficult regardless of their level of expertise within a particular domain (Burson, Larrick & Klayman, 2006). In other words, trying to assess one's performance compared to others is inherently difficult. In addition, Kruger and Dunning's (1999) measures assessing a given skill set were accused of being too simplistic. Burson et al. (2006) argued that everyone, regardless of ability, would perceive a test as being simple when it is and therefore everyone will report superior performance, but only those with top ability will be correct.

Ehrlinger et al. (2008) addressed these concerns in a series of studies demonstrating that Kruger & Dunning's (1999) pattern of results hold when correcting for statistical unreliability, when using ecologically valid measures of objective performance and including both comparative and non-comparative measures of perceived performance.

Another major concern regarding Kruger & Dunning's (1999) findings was that participants, particularly those who perform poorly on the task, will be highly motivated to preserve a positive self-image and may try to save face by drastically overestimating how well they performed. Those who found the task easy will also feel this self-image pressure, but their estimates of perceived performance will be accurate. To address this

alternative explanation, Ehrlinger et al. (2008) include conditions where they provide monetary incentives for participants to accurately report their performance, including a study where undergraduates were afforded the chance to win $100 if they could accurately report how many questions of logic ability they answered correctly (Ehrlinger et al. 2008, Section 2, Study 4). No participant was able to come close to this objective, despite the authors' assumption that $100 is incentive enough for the average undergraduate student to put aside concerns of image. Ehrlinger et al. (2008) address the motivation argument by using social incentives as well. In one of their studies, the authors introduce an 'accountable' condition where subjects are told they will have to provide an explanation to a supervising professor about their rationale for their self-assessment of their performance. Even with this social pressure, low performance individuals do not become more accurate in their self-assessment. In fact, participants became more confident of their inflated self-assessment.

Summary

Consumers searching out health information continues to increase. Consumers seek out or encounter health information from multiple sources including websites, print sources, physicians and friends and family (Eysenbach & Kohler, 2002; HSC Community Tracking Study Household Survey, 2001; HSC Community Health Tracking Household Study, 2007).

This behaviour may be, in part, due to the increased availability of health information for the average consumer and has possibly led to the medicalization of issues that were previously outside of the healthcare industries purview.

DTCA is often cited as a potential source of overmedicalization (Healy, 2004; Poitras & Meredith, 2009; Pollack et al., 2009). However, the exact mechanism of action between the consumer viewing DTCA and prescriptions being written is unclear.

Much research demonstrates that individuals are very poor at making self-assessments, both of their knowledge and predicting their own behavior. One possibility is that consumers are taking information gleaned from DTCA and overestimating just how qualified they are to make health care decisions.

This research attempts to clarify how and if consumers viewing DTCA may increase feel more knowledgeable about healthcare issues and if so, whether that feeling of increased skill translates into potentially unnecessary visits to the physician.

THEORETICAL MODEL AND HYPOTHESIS DEVELOPMENT

Consumers with low levels of knowledge suffer the dual burden of insufficient knowledge to be proficient in a given domain and low metacognitive ability such that they are unaware of their lack of proficiency. This research will extend this general finding to determine whether this behavior holds in the healthcare context. Next, the study measures what effect DTCA has on one's metacognitive ability. Lastly, these findings will be put into context by measuring what effect all of this has on drug inquiry intentions. Below is the theorized model.

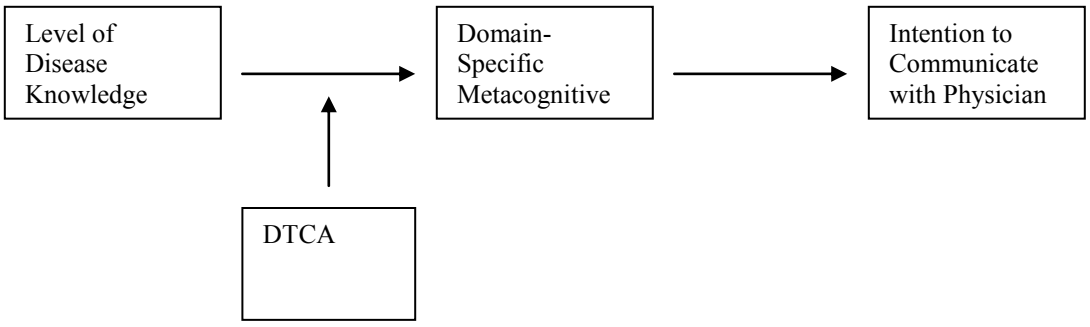

Fig 1. Proposed theoretical model tested in this research

DEVELOPMENT OF H1

Based on Kruger & Dunning's (1999) unskilled/unaware theory, patients with high levels of knowledge of a particular disease may be more likely to have high levels of

metacognitive ability; and therefore, are better able to make more accurate self-assessments of their ability. Contrary, patients with a low level of knowledge should suffer from the inverse.

Without the ability to recognize their knowledge about a given disease is limited, low disease knowledge consumers may be more likely to believe they are well-equipped to communicate with their physician about drugs in this category. Therefore, the following hypotheses were proposed:

H1a: Consumers with a low level of disease knowledge will be more likely to intend to communicate with their physician about a drug than high knowledge consumers.

H1b: Consumers with a high level of disease knowledge will be less likely to intend to request a drug from their physician than low knowledge consumers.

DEVELOPMENT OF H2

Consumers who possess high levels of disease knowledge should have the metacognitive skills to put their level of knowledge in perspective. The well-informed patient should understand that their physician is better informed than they are about current medications available for the treatment of depression. An (2007) found that consumer's drug request intentions were much lower than their drug inquiry intentions. This may be due to the fact that most consumers have enough general knowledge about health issues such that they have the ability to realize their physician has been educated in medicine and therefore feel intimidated making a direct drug request.

The inverse of the relationship between knowledge and drug request should be true for low knowledge patients. Consumers who have low levels of knowledge likely feel more confident in speaking to their doctor about a drug due to low metacognitive ability. Those who hold positive views of DTCA are more likely that those who hold negative views to request the advertised drug from their physician (Deshpande et al., 2004; Herzenstein et al., 2004; Peyrot et al., 1998; Singh & Smith, 2005). It is possible that those who hold positive views do so because they lack the knowledge to be critical of the information that is being presented to them in DTCA. Given the aforementioned reasons, the following hypothesis is tested in this study:

H2: Consumer's level of domain-specific metacognitive ability will partially explain the negative relationship between level of knowledge about a disease and intention to communicate with a physician.

DEVELOPMENT OF H3

Next, what role does DTCA play in this? Consumers may be less likely to initiate in-depth discussion with their physician or seek additional information about a drug after viewing DTCA (Maddox & Katsanis, 1997). One reason for this may be that DTCA bolsters patient's self-confidence. In addition, Hoek and Maubach (2007) postulate that DTCA may be increasing consumer's feelings of self-efficacy or self-confidence. Based on this, it is possible that DTCA will act as a moderator between the individual's objective level of knowledge and level of metacognitive ability. Specifically, DTCA will intensify the positive correlation between objective knowledge of the disease and

metacognitive ability. In other words, consumers with low levels of knowledge will be even more inaccurate in their assessment of their disease knowledge compared to those who do not see the DTCA.

H3a: Low disease knowledge consumers who view a DTC ad will have lower metacognitive awareness than low knowledge consumers who do not view a DTC ad.

H3b: High disease knowledge consumers who view a DTC ad will have metacognitive awareness that does not significantly differ from that of high knowledge consumers who did not view a DTC ad.

METHODS

PARTICIPANTS

Participant Recruitment

Participants were recruited to complete this study via Canadian Viewpoint's (Canview) web-based subject panel. Canview recruits subject pool participants from a variety of backgrounds across Canada. Panel members are sent invitations to participate in the survey. If they accept CanView's terms, they are directed to an online platform hosting this survey. Subjects then have to accept the terms of the study after reading the consent form. Subjects who reported presently being treated for depression or taking medication for depression were excluded.

Pretest Sample

To determine the validity and reliability of the questionnaire, a subsample of participants (n=50) were administered the survey. Thirty-seven males and 13 females, with a modal age of 25-44 years old participated. Their mean level of socio-economic status was 43.5, or medium business, technical class.

Main Sample

Once the validity and reliability of the questionnaire were established, the remaining participants were tested. Pretest participants completed the same procedure as main sample participants. As pre- and main- sample demographic characteristics were

similar across groups, samples were collapsed for a total of n = 377. The final sample consisted of 217 males and 160 females with a modal age of 45-64 years old. Their level of socioeconomic status was 37.72 or 'skilled workers' just slightly below the pretest socio-economic status.

STUDY DESIGN

Instrument

The platform used to develop this questionnaire is a Canadian-based company called FluidSurveys. This software allows the researcher to program the questionnaire and subsequently publish it online.

Knowledge About Depression

It was important to the theoretical model being tested in this study to be able to parse the influence of how much subject's actual versus perceived knowledge influences intention to communicate or request a drug from a physician. The measure that was thus needed was one that tests a layperson's objective level of general knowledge about depression. Such a measure, which balances technical and general knowledge, did not exist. Therefore, two surveys of depression knowledge were combined and adapted in order to create an appropriate measure. This measure was created in consultation with a practicing psychologist at a major teaching hospital. The first knowledge test chosen was Eli Lilly's depressionhurts.ca 'Understanding Depression' questionnaire. The 'Understanding Depression' questionnaire focuses strongly on knowledge about

depression symptoms and was adapted from American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM IV-TR). The second knowledge test chosen to create the measure was the National Alliance on Mental Illness's (NAMI) Depression Knowledge Quiz. This quiz is composed of seven questions which touch on symptoms, the ontogeny of the disorder, treatment etc. These two quizzes were merged to strike a balance between pharmaceutical industry and public interest groups perspectives on what constitutes 'general knowledge' about depression.

Metacogitive Ability

In order to test participant's metacognitive ability, what will be referred to as Kruger & Dunning's (1999) 'unskilled-unaware measure', was used. The particular measure was used specifically in their Study 2 looking at participant's logical reasoning ability and was emailed to the researchers by Dunning. This measure has also been used in various forms in many other publications (Burson, Larrick & Klayman, 2006; Ehrlinger & Dunning, 2003; Ehrlinger, Johnson, Banner, Dunning & Kruger, 2008; Dunning, Meyerowitz & Holzberg, 1989). The measure asks individuals to rate their performance relative to peers in terms of domain-specific as well as test-specific capacities. Domain specific questions ask participants to compare their level of general knowledge to others while test specific questions ask participants to compare their performance on this specific test to others. In these comparative questions, subjects are asked to rank their performance relative to their peers. This measure of metacognitive ability also includes a non-comparative item. This final question asks participants to estimate their raw score on the knowledge test.

Drug Request Intentions

The dependent measure of the model, participant's intentions to communicate and request a drug from their physician, was critical in order to make findings of this research relevant for the pharmaceutical industry and regulators alike. The 'Intended Communication Behavior Scale' developed by Young, Lipowski and Cline (2005) was chosen to measure this variable. Prior to the development of this measure, many researchers had used single point measures to determine participant's drug request intentions (Perri & Dickson, 1988; Williams & Hensel, 1995; Bell, Kravitz & Wilkes, 1999).

This scale was developed based on past research and direct communication with twenty individuals. These individuals informed researchers about the ways they believed they would approach their physician about a drug they had seen advertised. This method resulted in a 7-item measure with an 11-point scale ranging from not at all to extremely likely. The measure was replicated in this questionnaire save for the number of scale items, which were reduced for brevity.

Stimuli

In order to determine whether DTCA may bolster feelings of perceived knowledge, an altered print DTC ad for depression was inserted into the questionnaire to enhance the validity of the findings rather than simply having subjects recall a DTC ad they had seen in the past.

The decision was made to use a print rather than a video DTC ad similar to one that would appear on television for two reasons. First, the use of a print ad allows for

better control and this way, every participant is exposed to the same image. Conversely, using a video ad, it cannot be guaranteed that each participant would give equal amounts of attention to the ad. The print DTC ad is less dynamic and better ensures each participant processes the same information. Second, in order to preserve the realism of the ad, altering a print ad was more conducive to this goal than a video DTC ad.

The condition chosen for the DTC ad had to be one that affects a large population to be as relevant to as many study participants as possible. In order to limit responder fatigue, a single medical condition and ad were used to test the hypotheses. Depression was chosen because it is a condition that affects both younger and older populations roughly equally and an estimated one in ten Americans (Centre for Disease Control, 2008) and approximately 6% of the Canadian population currently suffers from depression (Stephens, Dullber & Joubert, 1999). Depression tends to be more prevalent in women than men, but is also a serious concern for men as it is more likely to result in suicide for this sex than women (NIMH, 2007). Therefore, depression is a condition that is highly relevant to the sample. Second, it was important that the condition chosen for the ad was one that is advertised by the pharmaceutical industry in reality. Findlay (2001) found that in 1998 and 1999 an antidepressant drug (Paroxetine) was one of the top 24 most heavily advertised. In fact, DTCA is focused on few therapeutic categories among the vast number possibly treated by pharmaceuticals. The top therapeutic categories advertised by the pharmaceutical industry include: anti-arthritics, cholesterol reducers, anti-ulcerants, anti-histamines, anti-asthma drugs and anti-depressants. Given this information and the knowledge that psychological disorders affect a large portion of the population, depression was the best choice of therapeutic category for this study.

In order to create a DTC ad for depression, a real DTC ad was modified. The chosen print ad was AstraZeneca's Seroquel XR (quetiapine fumarate) for the treatment of bipolar disorder and schizophrenia. This ad appeared in *People Magazine* beginning in December 2009. This ad was chosen for several reasons. First, the person in the image is female (representing those most diagnosed with the disorder). Second, this is a multi-page ad, which reflects the reality of how many ads are shown in magazines. Third, the expression of the individual in the ad is displaying sadness, which is most in line with one of the top-of-mind symptoms of the therapeutic category. Fourth, the ad was had not been in print for some time.

The Seroquel XR ad was modified using Adobe Photoshop CS4 Extended Version 11.0 for Mac. The brand name was changed to 'Zenalux'. Zenalux is a biomedical company located in Durham, North Carolina. Many names were considered and this name was chosen due to its ambiguity yet similarity to many drug brand names. The main colours of the ad were changed due to their strong association with the Seroquel XR brand. Additional information was integrated into the modified ad. Symptoms of depression as well as information of the neural mechanism underlying depression were added. Symptoms of depression were added for two purposes: (1) to substitute the large type found on the original Seroquel XR ad, and (2) generic symptom information was common in other print DTC ads for depression. Therefore, a symptom checklist found in an antidepressant ad, Pfizer's Effexor XR (venlafaxine HCl) was placed in the ad. Again drawing from Effexor advertising, this time from their website (http://www.effexorxr.com/effexor-xr-treatment.aspx), information about the neural underpinnings of depression as well as a diagram of neurotransmission were added. This

was added in order to give participants added information about depression and give the ad more visual appeal.

Control questions

An individual's SES is a predictor of many health-related issues. For example, a person's educational background is a predictive factor of cardiovascular risk (Winkleby, Jatulis, Frank & Fortmann, 1992). Those with low education and income bring forward more new reports of depression over a nine-year period compared to individuals with higher education and income (Kaplan, Roberts, Camacho & Coyne, 1987). Given this evidence, participant's SES acted as the main control variable in this study.

There is no one established measure of socio-economic status. However, Hollingshead's (1975) four-factor index of social status is commonly used. The original measure collects the SES of a given individual or household by measuring (1) gender, (2) marital status, (3) educational attainment and (4) occupation. For married individuals, resulting scores for the two people are summed and divided by two to determine the nuclear family's level of SES. For the purposes of this study only the individual's SES was required therefore the marital status item was removed from the scale.

Exclusion criteria

Potential survey respondents who have been diagnosed with, or are being treated for, depression were excluded from the data. Prior research has shown that patients with a condition are much more involved with healthcare decision-making (Arora & McHorney,

2000) and likely pay more attention to information presented and place more effort on comprehension (Celsi & Olson, 1988) than the average viewer.

Procedures

Canadian Viewpoint first sent an invitation to members of their panel. Survey participants first agreed to the terms and conditions set forth by Canadian Viewpoint. Once they agreed, participants were then redirected to the survey site, hosted by FluidSurveys. As soon as the participant arrived at the study website, they were presented with the consent form approved by the Concordia University Office of Research Ethics for this study. Participants were asked to read the consent form and check a box at the bottom of the page to indicate their understanding of the terms as well as their freely agreeing to participate. Participants could not continue with the survey without checking this box.

Once consent was obtained, participants were then asked to complete screening questions, including ones related to history of depression, age and gender. If participants indicated that they are currently being treated for depression or fell into an age or gender category that had already reached its quota, they were redirected to the debriefing page. In all other cases, the participants were moved on to the following page. After ensuring the participant met eligibility criteria, they saw general instructions of what is expected of them for each section of the survey.

Next, participants were asked to complete the depression knowledge test (see variable measures section for details). Subjects were not timed during this section and therefore had time to try and answer to the best of their abilities. Those in the

experimental group saw the DTC ad. Subjects had 60 seconds to review the contents of the ad. After 60 seconds, the ad was removed from the screen. After viewing the ad, experimental subjects were asked to complete the measure of metacognitive ability, Dunning & Kruger's (1999) 'unskilled-unaware measure'. The survey was programmed such that age and gender information recorded at the beginning for each participant were piped into this section so that subjects had a clear reference group with whom to compare themselves. The order in which the questions of this measure were presented was randomized across participants. Participants were then asked to complete the 'Intended Behavior Communication Scale'. Once this section was completed, participants responded to follow up and manipulation check questions. Finally, participants were automatically redirected to the debriefing form where an in-depth description of the study was given as well as further resources and the researcher's contact information.

RESULTS

PRELIMINARY ANALYSES

Normality Assumption Check

Each variable was tested in order to ensure assumptions of normal distribution were met (Appendix A). Each variable met this assumption; therefore, they were used in subsequent analyses without transformation.

Manipulation Check

In order to ensure that those participants who were randomly assigned to the test group (n=178) were paying attention to the ad shown, a series of manipulation check questions were asked regarding the content of the ad. Based on the results, participants were paying attention to the contents of the ad shown. The vast majority of subjects correctly answered questions about the name of the drug advertised (79% correct), the gender and age of the model featured in the ad (93% correct), as well as the condition being advertised (95.5% correct) (Figure 2).

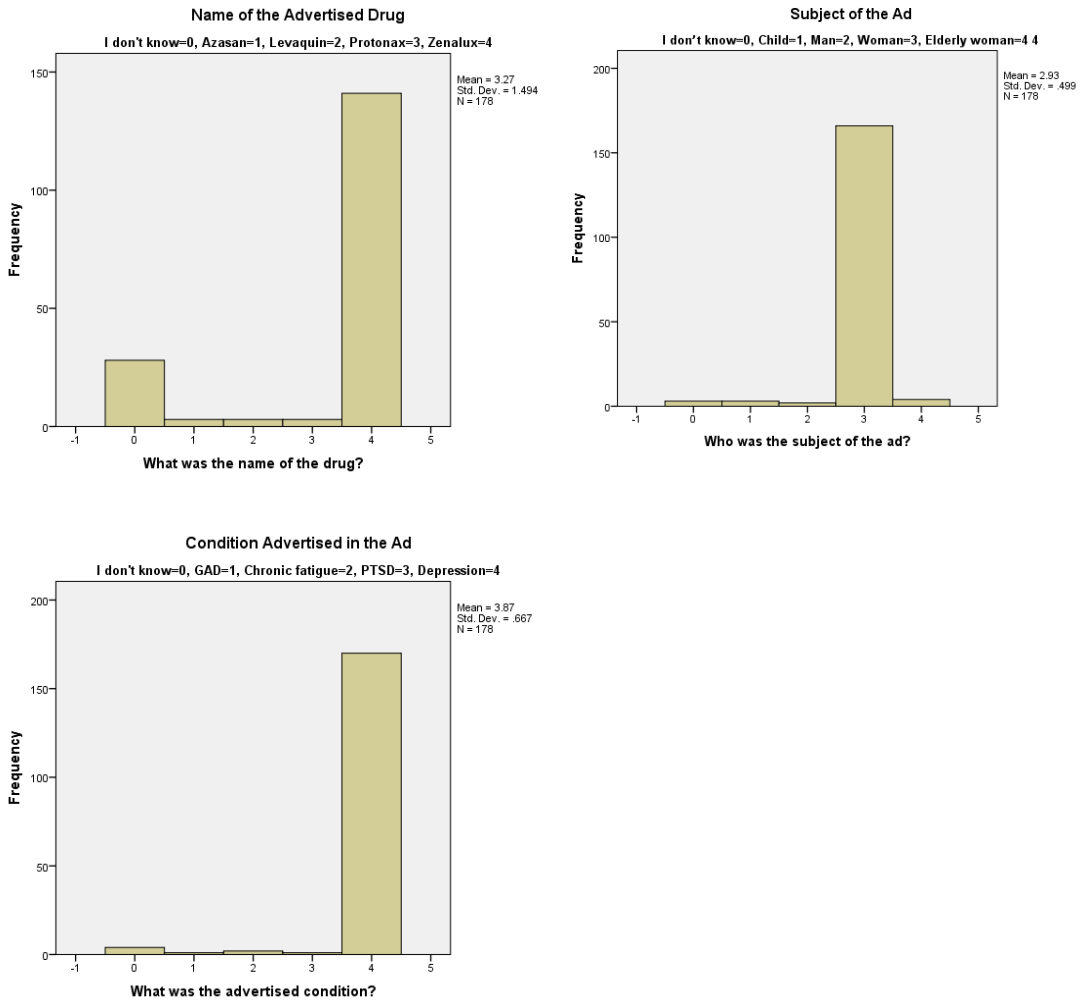

Fig 2. Results of manipulation check

Factor Analysis of the Intention to Communicate with Physician Scale

A factor analysis of the Intention to Communicate with Physician scale was undertaken in order to validate the scale being used in this context. Although the ICB scale was most appropriate for this study, it was initially validated only informally by Young, Lipowski and Cline (2005). They validated this scale by interviewing individuals familiar with the topic. In addition, other measures also considered for measuring this variable had only one item. Therefore, the current analysis was performed in order to

confirm whether these types of single-item measures are in fact appropriate or whether a more comprehensive measure such as the ICB scale is required.

A principal component analysis with varimax rotation was conducted on the seven items composing the ICB scale. Results showed that only the first factor was needed to explain variation of this variable (Eigenvalue = 4.55, 65.006% of variance explained). Therefore, in subsequent analyses, the ICB variable was tested using only the results from the factor analysis. In addition, other rotation types were conducted (quatramax, equimax and promax) to validate the varimax rotation results. Using these other rotation methods did not alter results (Appendix B).

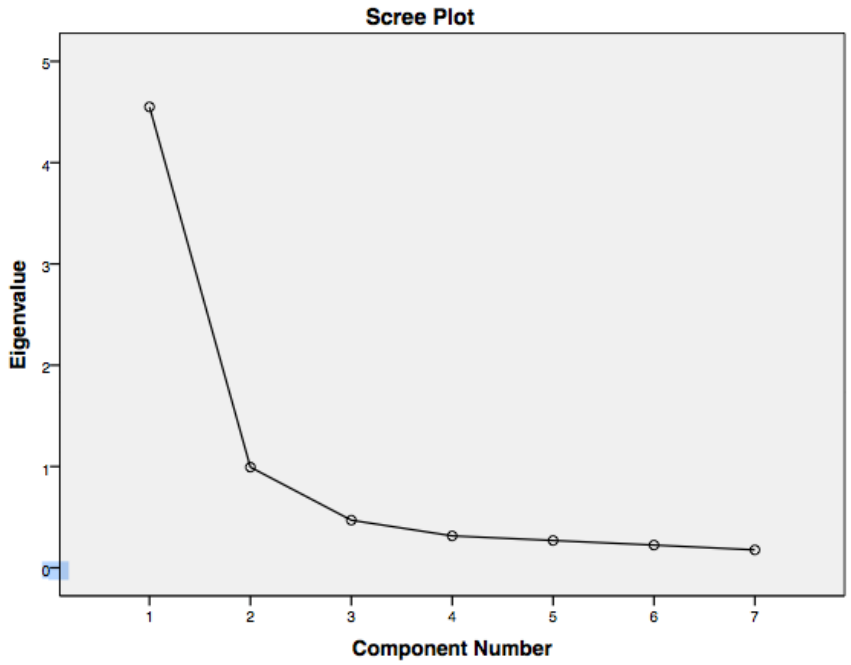

Fig 3. Eigen values of each ICB component

MAIN ANALYSES – MODEL AND HYPOTHESIS TESTING

Overall, subjects overestimate their performance. Indeed, performance is overestimated regardless of whether subjects do so comparatively or independently of comparasons with others. When subjects were asked to estimate their raw test score (out of 11), they overestimated by 2.22 points (t=-17.417, p<.000).

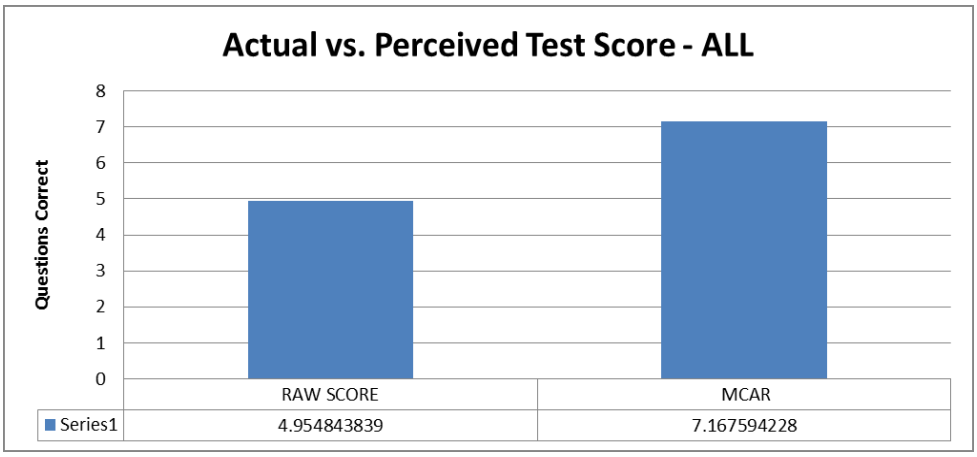

Fig 4. Raw score and perceived raw score for total sample

Subjects significantly overestimated their generally ability when comparing their knowledge to others by 5.7% (t=-5.274, p<.000) and comparing their test specific score to other's scores by 6.6% (t=-4.295, p<.000).

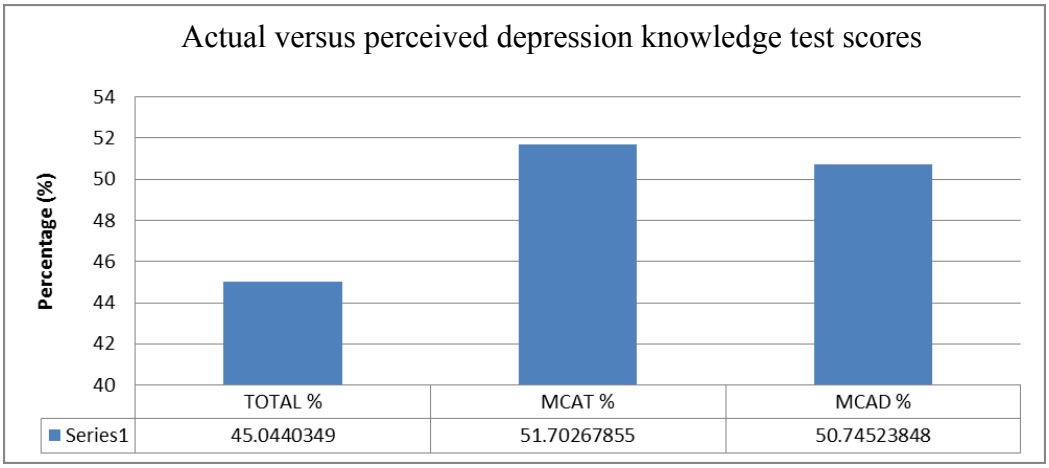

Fig 5. Comparison of test scores (total %) compared to estimated percent score on test and general depression knowledge compared to others.

Previously reviewed literature indicates that individuals tend to overestimate their performance in most areas. The aforementioned results are in line with that finding. However, the unskilled/unaware hypothesis (Dunning & Kruger, 1999) states that it is the individuals with the lowest amount of actual knowledge will most drastically in overestimate their performance compared to more knowledgeable individuals. Following Kruger and Dunning's procedure, subjects were grouped into quartiles based on actual depression knowledge test performance. A series of ANOVAs were conducted in order to determine whether there were significant differences between these depression knowledge ability quartile groups in terms of how well they were able to predict their actual performance. In order to do this, difference scores were created for each subject. Difference scores were created by subtracting the actual score from the estimated score.

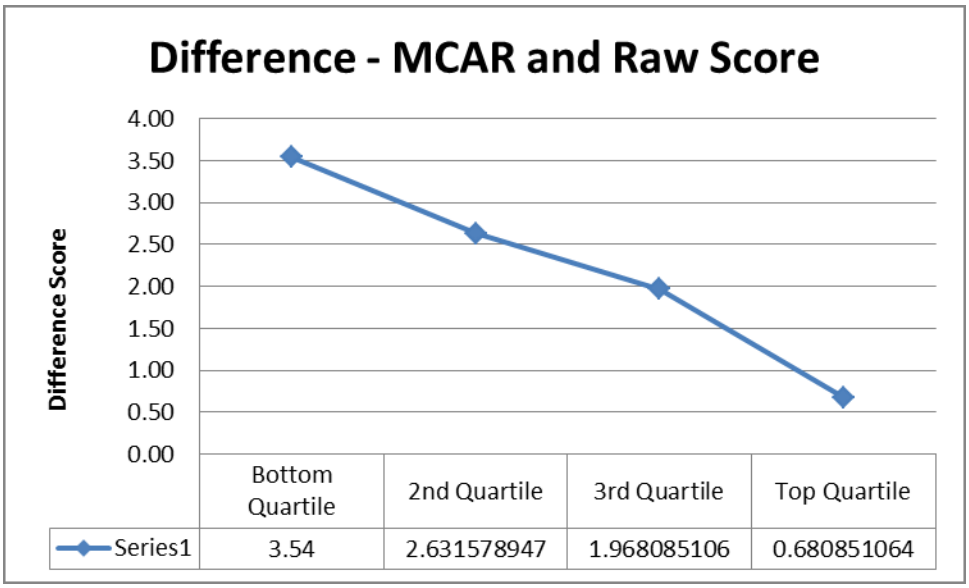

Fig 6. Difference scores of estimated and true raw score by quartile group

The first ANOVA that examined differences in estimated raw score by quartile group demonstrates that there are differences among groups ($F=27.247$, $p<.000$). The Bonferroni post-hoc comparison method, that the bottom quartile group significantly overestimated their score compared to all other groups. The top quartile was also significantly more accurate at self-assessment than the other groups. Although the second and third quartiles were not statistically significant from one another, they followed the general pattern of the theory-based trend and were significantly different from the top and bottom quartile difference scores (Table 1).

Table 1. Results of the Bonferroni post hoc test for difference score comparisons across knowledge test score quartile groups

Multiple Comparisons

Dependent Variable: Difference Score MCAR and Raw

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
	2	.91*	.325	.032	.05	1.77
1	3	1.57*	.326	.000	.71	2.44
	4	2.86*	.326	.000	2.00	3.73
	1	-.91*	.325	.032	-1.77	-.05
2	3	.66	.325	.253	-.20	1.53
	4	1.95*	.325	.000	1.09	2.81
	1	-1.57*	.326	.000	-2.44	-.71
3	2	-.66	.325	.253	-1.53	.20
	4	1.29*	.326	.001	.42	2.15
	1	-2.86*	.326	.000	-3.73	-2.00
4	2	-1.95*	.325	.000	-2.81	-1.09
	3	-1.29*	.326	.001	-2.15	-.42

Based on observed means.

The error term is Mean Square (Error) = 5.005.

*. The mean difference is significant at the 0.05 level.

The same pattern of estimation accuracy was found for both estimating specific test performance with others ($F= 20.323$, $p<.000$) and general depression knowledge compared to others ($F=22.448$, $p<.000$). Overall, top performers were much more accurate in their self-assessments, whereas the opposite was true for less knowledgeable participants (Figure 7 and 8).

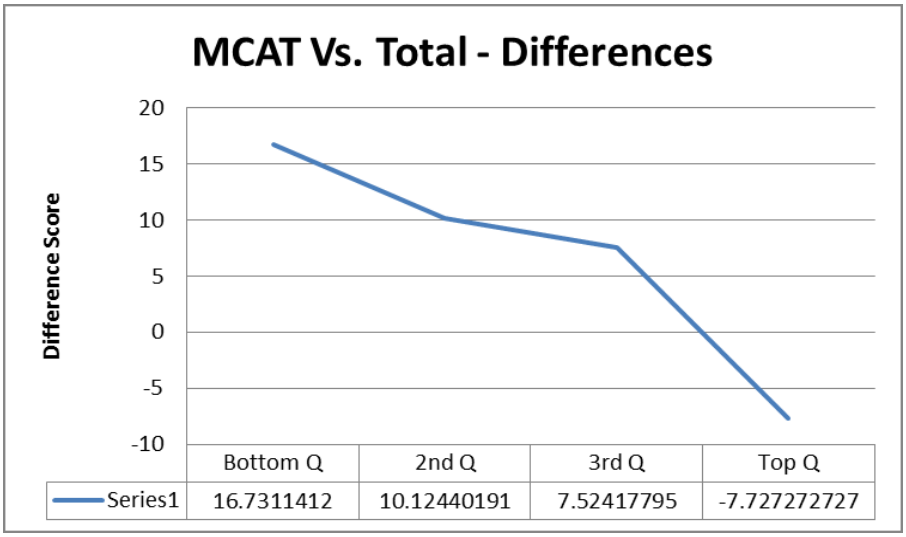

Fig 7. Difference scores for test score (%) and perceived test score (%) by quartile group

Table 2. Results of the Bonferroni post hoc test for estimated test scores comparisons across knowledge test score quartile groups

Multiple Comparisons

Dependent Variable: Difference Score MCAT and Estimated Percent Score

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
	2	6.51	3.344	.315	-2.36	15.37
1	3	9.38*	3.352	.032	.49	18.27
	4	25.17*	3.352	.000	16.28	34.06
	1	-6.51	3.344	.315	-15.37	2.36
2	3	2.88	3.344	1.000	-5.99	11.75
	4	18.66*	3.344	.000	9.80	27.53
	1	-9.38*	3.352	.032	-18.27	-.49
3	2	-2.88	3.344	1.000	-11.75	5.99
	4	15.79*	3.352	.000	6.90	24.68
	1	-25.17*	3.352	.000	-34.06	-16.28
4	2	-18.66*	3.344	.000	-27.53	-9.80
	3	-15.79*	3.352	.000	-24.68	-6.90

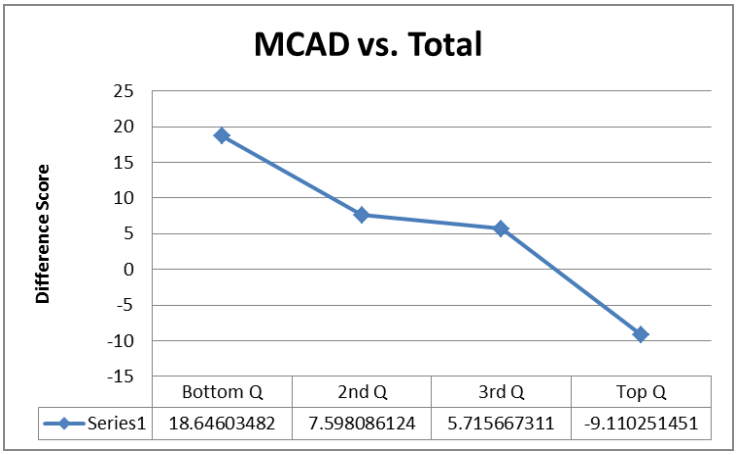

Fig 8. Difference scores by knowledge test quartiles for % score vs. estimation of general knowledge compared to others

Table 3. Results of the Bonferroni post hoc test for general knowledge difference score comparisons across knowledge test score quartile groups

Multiple Comparisons

Dependent Variable: Difference Score MCAD and Estimated Percent Score

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	10.95*	3.491	.011	1.69	20.21
	3	13.11*	3.500	.001	3.82	22.39
	4	28.47*	3.500	.000	19.18	37.75
2	1	-10.95*	3.491	.011	-20.21	-1.69
	3	2.16	3.491	1.000	-7.10	11.42
	4	17.52*	3.491	.000	8.26	26.78
3	1	-13.11*	3.500	.001	-22.39	-3.82
	2	-2.16	3.491	1.000	-11.42	7.10
	4	15.36*	3.500	.000	6.08	24.65
4	1	-28.47*	3.500	.000	-37.75	-19.18
	2	-17.52*	3.491	.000	-26.78	-8.26
	3	-15.36*	3.500	.000	-24.65	-6.08

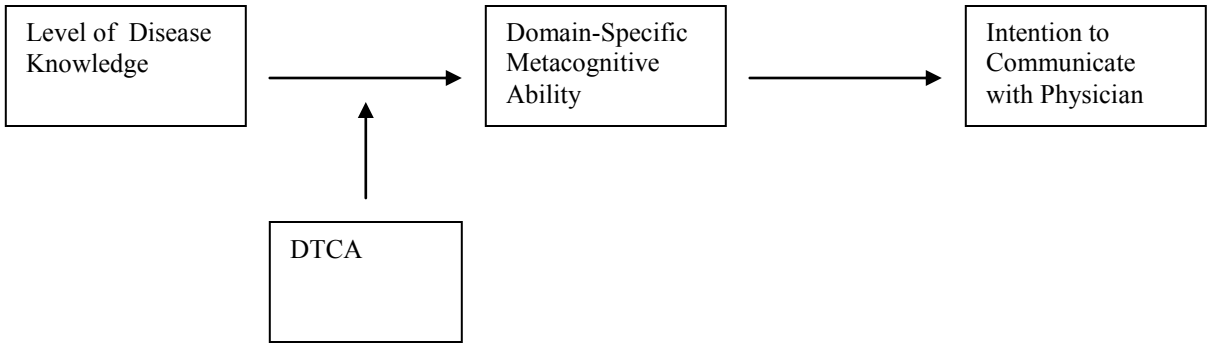

Fig 9. Proposed theoretical model tested in this research

Results of Inferential Statistics for Model

In order to test the proposed model's validity, a series of regression analyses following the Baron & Kenny (1986) mediation regression analysis method were performed. First, the zero-order relationships of this model were tested. As stated in H1, the first relationship of interest is whether level of knowledge about depression predicts intention to communicate with one's physician.

H1a: Consumers with a low level of disease knowledge will be more likely to intend to communicate with their physician about a drug than high knowledge consumers.

H1b: Consumers with a high level of knowledge about disease will be less likely to intend to request a drug from their physician than low knowledge consumers.

The analysis revealed that there is no significant relationship between subject's depression knowledge and their intention to communicate with their physician about medication ($F=2.15$, $p > .05$). Therefore, both H1a and H1b were not supported, as there is no relationship between the theorized independent and dependent variables.

As H1 is not supported, logically, neither will H2.

H2: Consumer's level of domain-specific metacognitive ability will partially explain the negative relationship between level of knowledge about disease and intention to communicate with a physician.

There is no linear or predictive relationship between actual and perceived scores. Subjects' performance on the disease knowledge test did not relate to where they perceived themselves ranking compared to others in general knowledge ($F=0.25$, $p=.618$). In addition, their actual disease score performance did not relate to where they perceived themselves to rank compared to others on this specific test ($F=1.933$, $p=.165$). Finally, their raw score on the disease test was not related to what they perceived their raw test score to have been ($F=.107$, $p=.744$).

For thoroughness, a series of regressions were performed in order to assess the relationship between metacognitive ability and intention to communicate with the physician. It was discovered that subject's comparisons of their general domain specific knowledge to others ($F=6.996$, $p=.009$), comparison of their performance on the test compared to other test-takers ($F=7.949$, $p=.005$) and their estimation of how well they performed on the depression knowledge test ($F=9.851$, $p=.002$) all significantly related to the intention to their communicate with their physician.

The final proposed relationship between model variables relating to DTCA was assessed.

H3a: Low depression knowledge consumers who view a DTC ad will have lower metacognitive awareness than low knowledge consumers who do not view a DTC ad.

H3b: High depression knowledge consumers who view a DTC ad will have

metacognitive awareness that does not significantly differ from that of high knowledge consumers who did not view a DTC ad.

To test H3a and H3b and determine whether DTCA had any impact on subjects' metacognitive ability, multiple regressions were conducted. Overall, the regressions using the three types of metacogntive ability measures were significant (MCAD: F=3.515, p=.031; MCAT: F=3.988, p=.019; MCAR: F=4.912, p=.008). However, this was due to the metacognitive variables and not the DTCA manipulation. Whether or not subjects were exposed to the manipulation in fact had no bearing on whether they intended to communicate with their physician regardless of what type of metacognitive measure was used: (MCAD: t=.227, p=.821; MCAT: t=.217, p=.828; MCAR: t=.015, p=.988).

Table 4. Summary of hypotheses results

Hypothesis	**Conclusion**
Unskilled/Unaware	Supported
H1a	Not supported
H1b	Not supported
H2	Not supported
H3a	Not supported
H3b	Not supported

Follow up analysis

Although not all initial hypotheses were supported, a direct relationship between subjects' perceived level of knowledge and intention to communicate with their physician was uncovered.

To follow up on this finding, subjects were asked a series of questions that probed into their rationale regarding why they would or would not follow up to ask their physician for the drug they saw advertised in the DTC ad.

Subjects who were exposed to the manipulation were asked if they were diagnosed with depression, whether or not they would request the drug they had just seen advertised. The majority of individuals reported that they would not do so (Figure 11).

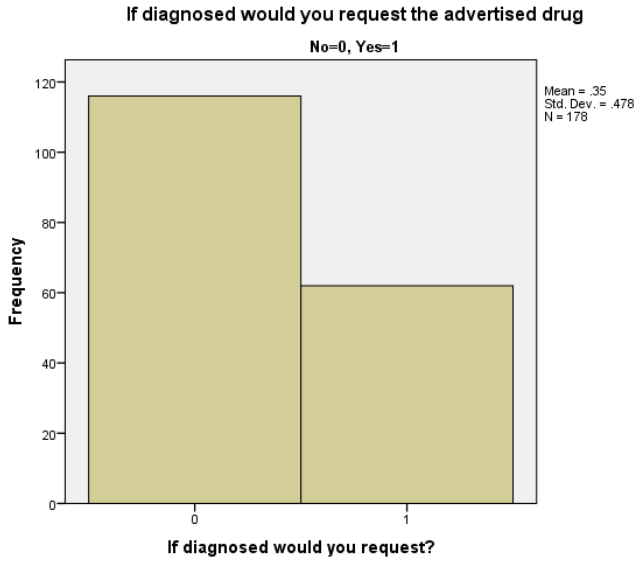

Fig 10. Participants' intention to request the specific drug

A large portion of low-knowledge respondents stated they trust their doctor to know what is best for them and that was why they would not request a drug. In comparison, 64% of low knowledge respondents who would request a drug stated they would do so because they think they understand their own health condition best. This is

shocking, particularly when only half of high knowledge patients who would request a drug cited the same reason.

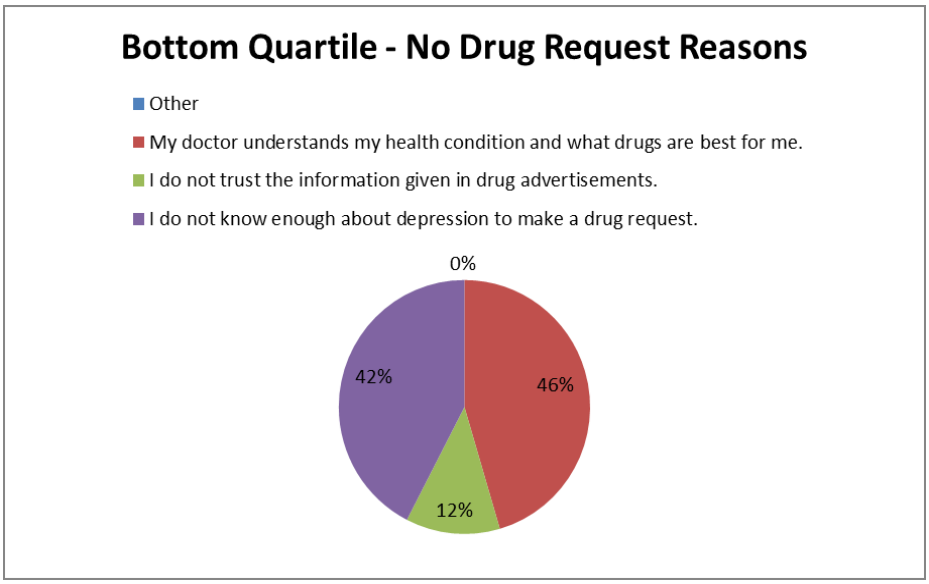

Fig 11. Low knowledge consumers' rationale for not requesting the advertised drug

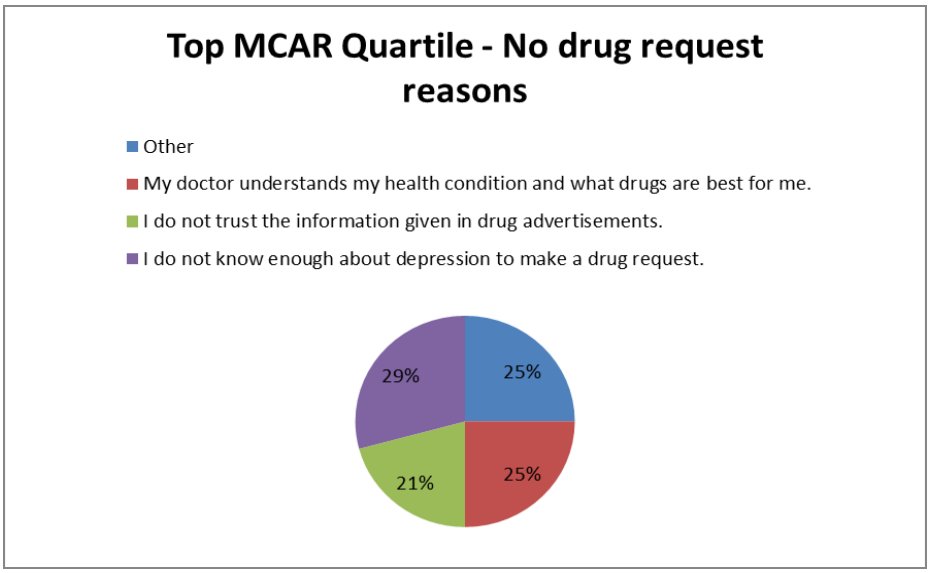

Fig 12. High knowledge consumers' rationale for not requesting the advertised drug

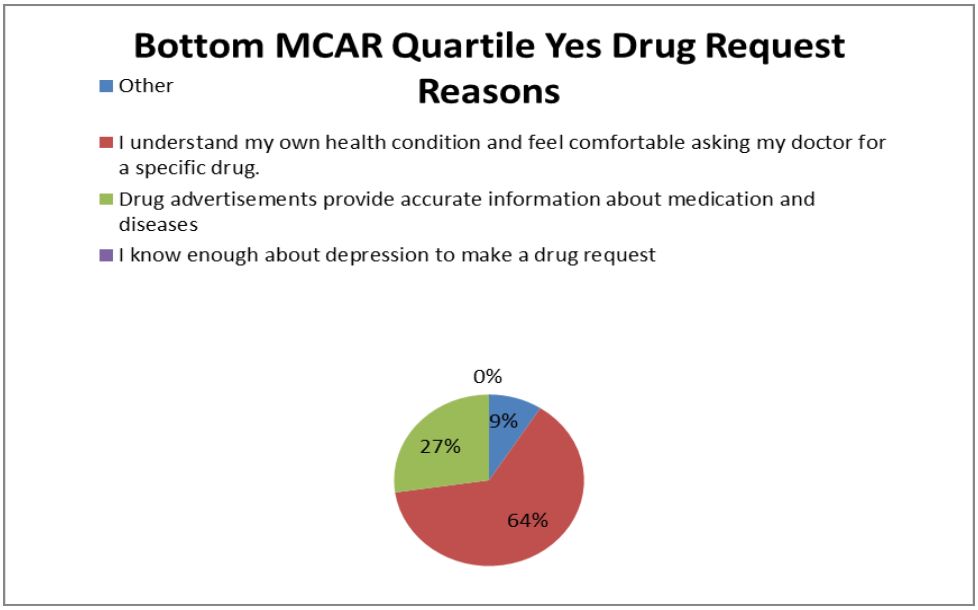

Fig 13. Low knowledge consumers' rationale for requesting the advertised drug

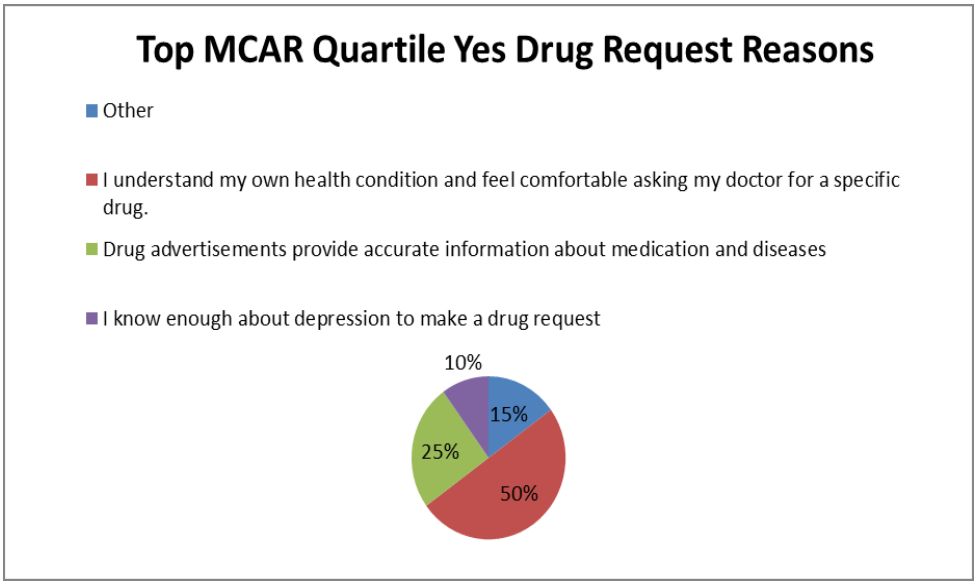

Fig 2. High knowledge consumers' rationale for requesting the advertised drug

DISCUSSION

THEORETICAL AND PRACTICAL IMPLICATIONS

Measuring intention to communicate with the physician

In prior research (Bell et al., 1999; Perri & Dickson, 1988; Williams & Hensel, 1995), the intention to request a drug or talk to a physician was measured using a single item. For example, Williams and Hensel (1995) measured drug request intentions by asking: "I'm going to ask my doctor about nitroglycerin patches'' anchored with a Likert-type scale. Young, Lipowski and Cline (2005) argued that a single point measure simply was not enough to capture the consumers' intention to request a drug. However, this suggests that in fact, a single point measure, willingness to talk to one's physician, may be sufficient to predict the likelihood of a patient's intentions to inquire about a drug to a physician. Young, Lipowski and Cline's (2005) Intention to Communicate with Physician measure is composed of seven questions, each on an 11 point scale. Through a factor analysis, this research reveals that this level of complexity may not required in order to measure this variable. Therefore, although previous research had used a single point measure without validation, it may in fact, be the correct and most parsimonious way to approach capturing this variable. This finding is significant in that it brings forward a more valid and reliable way to measure this variable in future research.

Unskilled and Unaware

Consistent with previous findings (Kruger & Dunning, 1999; Ehrlinger et al., 2008), participants in this study conformed to expected results and overestimated how

well they performed on the disease knowledge test, both comparatively with others and objectively by estimating their own raw score.

This advances previous theories in two main ways. Past research in this domain has focused mainly on general knowledge tasks. For example, Dunning and Kruger's (1999) seminal research focused on participants' knowledge in domains of humor, logical reasoning and grammar. The fact that individuals still overestimate their abilities even in a specialized knowledge domain in which they do not have formal training is significant: It suggests that the need to think positively of oneself is deeply engrained.

Past research, most notably that of Baumeister (1989), shows that positive illusion, whether about oneself or one's surroundings, is psychologically adaptive. Conversely, individuals who have highly accurate perceptions of themselves and their environment, often show signs of depression and maladaptive tendencies. This finding supports that general body of work.

Those who are unskilled are also the most unaware

Results demonstrate that consistent with the 'Unskilled/Unaware" hypothesis, first postulated by Kruger and Dunning (1999), individuals who rank the lowest in objective ability are also the ones who most drastically overestimate how well they perform.

This finding is important theoretically for several reasons. First, prior research of this theory had mainly focused on testing student populations (Dunning & Kruger, 1999) In the rare instances in which a non-student population has been studied, it was in a domain in which the participants had extensive experience (Ehrlinger et al., 2008). This

study in novel in that it tests a sample of adults on their knowledge of a domain in which the average person is not an expert and has no formal training. Despite these novel testing conditions, the unskilled/unaware theory appears to hold.

What implications does this result have for pharmaceutical industry stakeholders? This finding suggests it is to educate the general public about healthcare issues. As Dunning and Kruger (1999) found, increasing objective levels of knowledge in a given domain also increases metacognitive ability. Therefore, ironically, the more you know, the more you are aware of the limitations and boundaries of your own knowledge. Educating consumers about a particular healthcare issue may allow them to place their level of knowledge in perspective, understand where their gaps in knowledge lie and allow them to have more meaningful conversations with their respective healthcare providers.

Numerous studies show that patients who visit a physician and ask about, or request a prescription are more likely to receive it than those who do not (Kravitz et al., 2005). Patient involvement in their own healthcare is significant and continues to grow (Barlow, Turner & Wright, 2000; Lorig et al., 1999; Shaw & Baker, 2004). These results suggest that physicians should be cautious when heeding to their patients requests. Some of these requests could be coming from patients who actually have low levels of knowledge about the disease and may not even know that their request may be unwarranted. Therefore, these results suggest that physicians should invest time in having a conversation with their patient who inquires about a drug to ensure that their patient is informed and that prescribing a given therapy is truly in the patients' best interest.

Level of knowledge does not predict intention to speak to physician

The findings of this study suggest that there was no significant relationship between the level of knowledge participants achieved in their disease knowledge test and their willingness to speak with their physician. Although no conclusive results can be drawn from this finding, there are several possibilities of what this result may imply and could be tested in future research. First, there are some other variables that may be involved in the patients' decisions to visit their doctor. In An's (2007) study, perceived level of knowledge moderated the relationship between attitude toward DTCA and drug inquiry intentions. Therefore, it is possible that attitudes have more impact on speaking to one's physician than cognitive knowledge factors.

In terms of what this might mean for policy makers and regulators, there is the possibility that pharmaceutical companies' use of educational advertising may only have a negligible effect on consumer's actually taking the time to visit their physician. What may matter more are individuals' attitudes toward DTCA in general.

Metacognitive ability predicts willingness to speak to ones physician

One's level of perceived knowledge suggests increased willingness to speak to one's physician. Similarly to An's (2007) finding, this suggests that it is one's own perceptions, attitudes or emotions that play more of a role in visiting the physician than the objective level of knowledge. This finding has many implications, particularly for health care stakeholders. For regulators, if the objective is to prevent patients from seeking out unnecessary treatment, then the goal must also be to change attitudes toward DTCA and advertising rather than simply countering promotional tactics with educational

ones. For the pharmaceutical industry, this finding suggests that they should be trying to heighten positive attitudes and feelings of empowerment in the patient.

DTCA does not have a significant effect on metacognitive ability

Results suggest that DTCA had no meaningful effect on metacognitive ability, or how one interprets ones own knowledge. Initially, one of the research questions of this study was whether DTCA has the effect of making consumers feel more educated perhaps without really providing any true educational value. This was postulated due to previous research which states that exposure to DTCA increases the potential for unwarranted trips to the physician (Murray et al., 2003). However, this was not found to be the case.

This result suggests that DTCA may be providing actual educational value for consumers or really has no effect on perceived knowledge at all. Either way, the potential practical implication of this is that regulators concerns about potential misleading knowledge found in DTCA may be overstated. Rather, regulators may need to continue to focus more specifically on what mechanism links viewing DTCA to drug requests.

Trust in physician decreases with increases in level of self-reported knowledge

Descriptive analysis of follow up questions included in the study reveal that there is a trend toward those who put less trust in their physician report possessing the highest levels of knowledge. Based on the results of this study and previous research (Dunning & Kruger, 1999; Dunning, Heath & Suls, 2004; Ehrlinger et al., 2008), patients who self-report the highest levels of knowledge are not always the most knowledgeable.

Therefore, this finding suggests that there is a risk that individuals with low levels of knowledge are not confiding or putting trust in their physician when perhaps they should. Take for example, this quote:

"I can get three types of health information: I can print out information from the internet, I can read some literature, and I can talk to my doctor. Then I can see whether this information is congruent or differs. *So, as a layperson, I obtain some kind of medical know-how and I can disagree with my doctor"*

- Participant response "Using the internet for health information", Eysenbach & Kohler, 2002, p575

This result provides a possible explanation for why overestimation of one's knowledge is particularly detrimental to that relationship. A bit of knowledge enhances patients' feelings of knowledge and this may incite them to visit their physician.

Many have argued that DTCA interferes with the patient physician relationship (Mintzes et al., 2003; Kravitz, 2000). Stakeholders on the pro-DTCA side argue that education and patient empowerment is truly a step in the right direction and physicians just need to adapt from the traditional one-way flow of information from themselves to patients (Welch, Cline & Young, 2005; Calfee, 2002). This finding contradicts none of these positions. However, it does suggest that patient empowerment must be done correctly and thoroughly enough for the patient to not only feel knowledgeable, but be knowledgeable so that if they feel the need to go against their physician's recommendations or seek a second opinion, they are doing so to their own benefit.

This finding suggests that what regulatory bodies should be most concerned about is how to empower physicians to deal with consumers who may come in to their office with potentially incorrect ideas.

STUDY LIMITATIONS

This validity of this study is limited by several factors that can be improved upon in future research.

Measure of depression knowledge

This study used a measure of gauging participants' general knowledge about depression that was not formally validated. As there was no existing measure that truly captured general knowledge about depression for a layperson, two measures intended for layperson use were combined to form one measure and was validated by a licensed psychologist on the faculty of a teaching hospital. However, there was no validation of the measure's reliability with a pre-existing depression knowledge scale because one does not exist.

Sample Selection

Sample selection for this study was not random. Although CanView takes a sample that reflects general demographics of Canada, participants are part of a panel. Therefore, the behavioral, psychological and other characteristics of this panel may not necessarily match those in the general population from a random sample. However, participants were randomized across control and test conditions to eliminate any biases within the sample itself.

Administration of the manipulation (DTC ad)

Another limitation of this study is the way in which the manipulation was administered to participants. Exposure to DTCA may not be ecologically valid and does not reflect how individuals are exposed to DTCA in a non-experimental setting. For example, this study is cross-sectional and cannot capture the effect of long-term exposure to DTCA over time and across media. The lack of ecological validity in this study reduces confidence in external validity and ability to generalize findings.

Mediating and moderating variables

While efforts were made to capture relevant variables in this study, not all hypothesized results were found to be significant. Therefore, the model originally proposed is lacking explanatory power in the form of other variables that would better explain the path from consumer's knowledge to intention to communicate with the physician.

The focus of this study was on cognitive factors that affect intention to talk to the physician. This study did not address other environmental factors, personality factors or social factors. However, other research is beginning to study these factors. For example, certain authors are beginning to investigate the impact of socio-cultural factors, such as the society-wide increased focus on health issues (Brennan et al., 2010; Davis, 2006; Poitras & Meredith, 2009) and how that relates to medicalization. However, the scope of this project truly was to address whether cognition and knowledge could explain medicalization.

DIRECTIONS FOR FUTURE RESEARCH

What environmental factors are causing increases in perceived level of knowledge?

One of the most pressing questions that arise from this study is what factors are causing individuals to overestimate their disease knowledge. There is a plethora of research which states that individuals are innately biased to over estimate their abilities (Dunning & Kruger, 1999; Ehrlinger et al., 2008; Dunning et al., 2004; Ehrlinger & Dunning, 2003; Dunning et al. 1989), think positively about themselves (Baumeister, 1989) and even rationalize that other are more prone to making these types of biased judgment than themselves (West, Meserve & Stanovich, 2012).

The next wave of research in this domain would be well served by investigating potential moderators of this effect in the health domain. Being able to determine what factors heighten positive self-perceptions and what factors actually push individuals to go from overestimating their disease knowledge to making a trip to their doctor's office would be informative and have profound implications for both regulators and the pharmaceutical industry alike.

Does disease category matter?

In this study, depression was used as the disease in question as it is common to both men and women and is frequently the subject of DTCA. However, Keselman et al. (2008) found in their work that participants had a particular difficult time retrieving a correct diagnosis of angina based on symptoms provided, possibly because no one knew what angina was. Therefore, it is open to question of whether a more obscure, less

frequently advertised disease were used in this type of research whether similar results would be obtained.

It would be interesting to see just how far consumer's self deception goes. For example, if participants were presented with an ad for Johnson & Johnson's Cypher™ and asked about their knowledge of percutaneous transluminal coronary angioplasty, it would be interesting to see whether results would be similar and whether the same biases of overestimation of knowledge would still appear. Investigating this would have much practical value should DTCA in the U.S. broaden to less familiar categories as it did in 2007 by Johnson & Johnson (Boden & Diamond, 2008).

Do other forms of DTCA affect metacognitive ability?

Results from this study show that branded DTCA may not have any effect on metacognitive ability, which in turn influences likelihood to go visit a physician. However, it would be important to determine whether other forms of DTCA have the same effect. It would be interesting to see whether educational ads or reminder ads have a similar null effect on metacogntiive ability. Future research should investigate this in order to have a fuller picture of the influences of all forms of DTCA. This would have important consequences for regulators in both the U.S. and Canada.

The impact of an educational intervention

In their research, Dunning and Kruger (1999) found that the best way to reduce individuals' biases of overestimating their knowledge was to actually improve their level of knowledge. In this case, it is important to determine whether this would also be the

case in the healthcare domain. In addition, there would be practical implications as well for determining whether educating consumers could potentially decrease the number of unnecessary visits to health care professionals.

How to empower physicians and health care professionals

One of the realities that all stakeholders must come to terms with is that with the vast amount of information now available to consumers (particularly via the internet), is here to stay. Consumers now have access to information, both correct and incorrect, and that is a reality that physicians and regulators must deal with. What this study suggests is that there is a risk of consumers visiting their physician feeling knowledgeable without this in fact being the reality. Physicians often emphasize that DTCA is a burden to them because it takes time away from practicing medicine when they have to explain to patients that, for example, the latest drug they have seen or heard about is actually not suitable for them (Shaw & Baker, 2004). Future research should focus on the best practices of how to train physicians to deal with these types of situations in a positive and time effective manner.

CONCLUSION

This study and future research investigating the causes of prescription drug request will be able to add insight into how consumers operate in the healthcare marketing domain. Ultimately, future research should be synthesized in order to develop a model of how patient-directed pharmaceutical advertising affects the consumer and how that interacts with other social, environmental, demographic and psychological variables. One day, having this level of understanding and power to predict at what point a consumer will reach out to a health care professional about a drug will be a very powerful tool. This knowledge and understanding will have implications for all stakeholders involved: regulatory, the pharmaceutical industry, government and most importantly, the consumer themselves.

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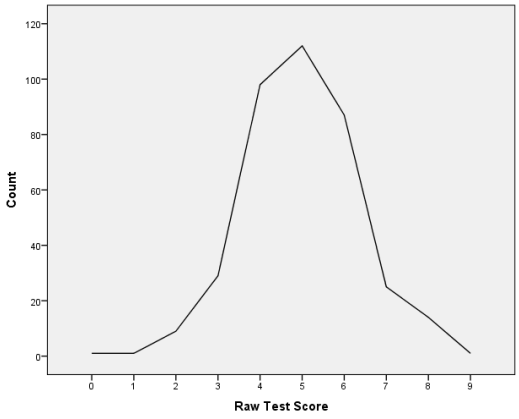
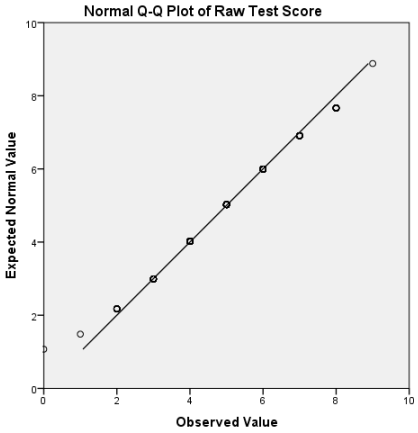
APPENDIX

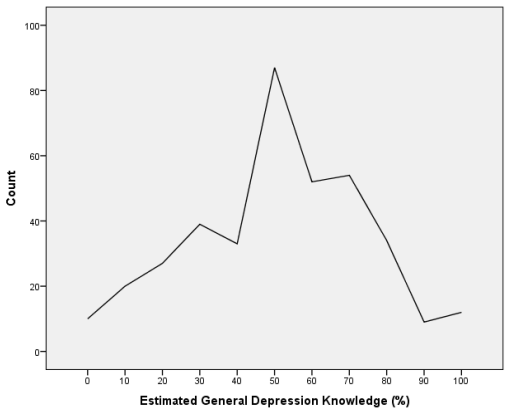
APPENDIX A: NORMAL DISTRIBUTION ASSUMPTION

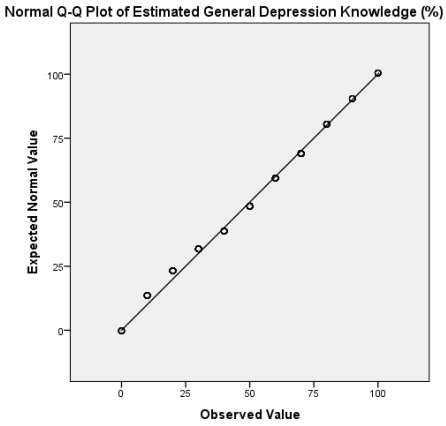
Depression knowledge raw test score



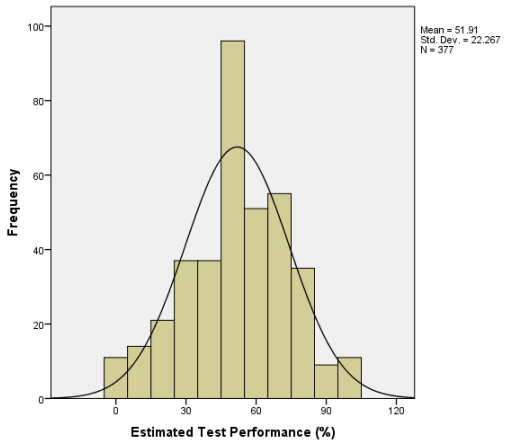


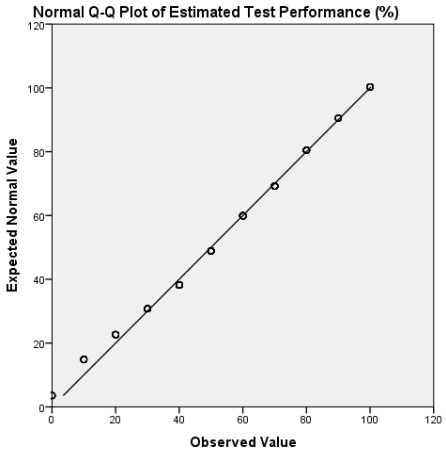
Metacognitive ability estimated general knowledge score



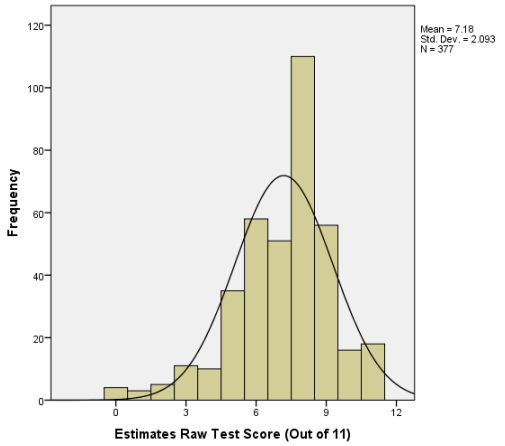


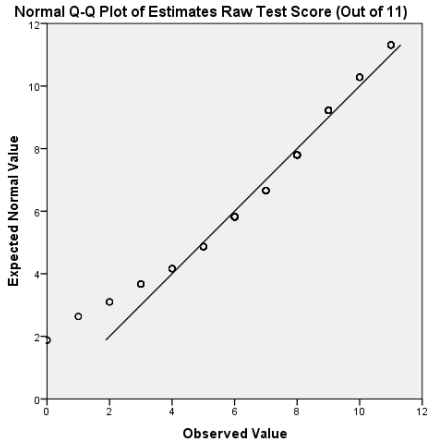
Metacognitive ability estimated test-specific score





Metacognitive ability estimated raw score





APPENDIX B: FACTOR ANALYSIS OF INTENTION TO COMMUNICATE WITH PHYSICIAN (ICB)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.550	65.006	65.006	4.550	65.006	65.006
2	.994	14.194	79.201			
3	.470	6.716	85.916			
4	.315	4.501	90.417			
5	.270	3.852	94.269			
6	.224	3.205	97.474			
7	.177	2.526	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Q1	.836
Q2	.838
Q3	.902
Q4	.873
Q5	.729
Q6	.815
Q7	.615

Extraction Method: Principal Component Analysis.

Communalities

	Initial	Extraction
Q1	1.000	.699
Q2	1.000	.703
Q3	1.000	.813
Q4	1.000	.762
Q5	1.000	.531
Q6	1.000	.664
Q7	1.000	.379

Extraction Method: Principal Component Analysis.

APPENDIX C: GENERAL OVERESTIMATION OF PERFORMANCE

Paired samples t-test comparing perceived and actual disease knowledge test score

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Raw Test Score	4.98	377	1.330	.068
	Estimates Raw Test Score (Out of 11)	7.18	377	2.093	.108

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Raw Test Score & Estimates Raw Test Score (Out of 11)	377	.017	.744

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Raw Test Score - Estimates Raw Test Score (Out of 11)	-2.207	2.460	.127	-2.456	-1.958	-17.417	376	.000

Paired samples t-test comparing perceived test percentile ranking and actual rank

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Raw Test Score (%)	45.24	377	12.088	.623
	Estimated Test Performance (%)	51.91	377	22.267	1.147

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Raw Test Score (%) & Estimated Test Performance (%)	377	.072	.165

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Raw Test Score (%) - Estimated Test Performance (%)	-6.672	24.564	1.265	-9.160	-4.185	-5.274	376	.000

Paired samples t-test comparing perceived general depression knowledge and actual depression knowledge test score

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Raw Test Score (%)	45.24	377	12.088	.623
	Estimated General Depression Knowledge (%)	50.95	377	23.159	1.193

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Raw Test Score (%) & Estimated General Depression Knowledge (%)	377	.026	.618

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Raw Test Score (%) - Estimated General Depression Knowledge (%)	-5.717	25.846	1.331	-8.335	-3.100	-4.295	376	.000

APPENDIX D: COMPARING DIFFERENCE SCORES ACROSS ACTUAL DEPRESSION KNOLWEDGE SCORE QUARTILE GROUPS

Difference score comparison for raw score and estimated raw score by quartile group

Between-Subjects Factors

		N
Quartile Group for Depression Knowledge Test Score	1	94
	2	95
	3	94
	4	94

Tests of Between-Subjects Effects

Dependent Variable: Difference Score MCAR and Raw

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	409.097[a]	3	136.366	27.247	.000
Intercept	1834.220	1	1834.220	366.497	.000
TESTQ	409.097	3	136.366	27.247	.000
Error	1866.765	373	5.005		
Total	4112.000	377			
Corrected Total	2275.862	376			

a. R Squared = .180 (Adjusted R Squared = .173)

Multiple Comparisons

Dependent Variable: Difference Score MCAR and Raw

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.91*	.325	.032	.05	1.77
	3	1.57*	.326	.000	.71	2.44
	4	2.86*	.326	.000	2.00	3.73
2	1	-.91*	.325	.032	-1.77	-.05
	3	.66	.325	.253	-.20	1.53
	4	1.95*	.325	.000	1.09	2.81
3	1	-1.57*	.326	.000	-2.44	-.71
	2	-.66	.325	.253	-1.53	.20
	4	1.29*	.326	.001	.42	2.15
4	1	-2.86*	.326	.000	-3.73	-2.00
	2	-1.95*	.325	.000	-2.81	-1.09
	3	-1.29*	.326	.001	-2.15	-.42

Based on observed means.

The error term is Mean Square(Error) = 5.005.

*. The mean difference is significant at the 0.05 level.

Difference score comparison for general depression knowledge ranking by quartile group

Between-Subjects Factors

		N
Quartile Group for Depression Knowledge Test Score	1	94
	2	95
	3	94
	4	94

Tests of Between-Subjects Effects

Dependent Variable: Difference Score MCAD and Estimated Percent Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	38772.249[a]	3	12924.083	22.448	.000
Intercept	12800.800	1	12800.800	22.234	.000
TESTQ	38772.249	3	12924.083	22.448	.000
Error	214752.224	373	575.743		
Total	266351.000	377			
Corrected Total	253524.472	376			

a. R Squared = .153 (Adjusted R Squared = .146)

Multiple Comparisons

Dependent Variable: Difference Score MCAD and Estimated Percent Score

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	10.95*	3.491	.011	1.69	20.21
	3	13.11*	3.500	.001	3.82	22.39
	4	28.47*	3.500	.000	19.18	37.75
2	1	-10.95*	3.491	.011	-20.21	-1.69
	3	2.16	3.491	1.000	-7.10	11.42
	4	17.52*	3.491	.000	8.26	26.78
3	1	-13.11*	3.500	.001	-22.39	-3.82
	2	-2.16	3.491	1.000	-11.42	7.10
	4	15.36*	3.500	.000	6.08	24.65
4	1	-28.47*	3.500	.000	-37.75	-19.18
	2	-17.52*	3.491	.000	-26.78	-8.26
	3	-15.36*	3.500	.000	-24.65	-6.08

Based on observed means.

The error term is Mean Square(Error) = 575.743.

*. The mean difference is significant at the 0.05 level.

Difference score comparison for test specific knowledge ranking by quartile group

Between-Subjects Factors

		N
Quartile Group for Depression Knowledge Test Score	1	94
	2	95
	3	94
	4	94

Tests of Between-Subjects Effects

Dependent Variable: Difference Score MCAT and Estimated Percent Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32203.999[a]	3	10734.666	20.323	.000
Intercept	17318.619	1	17318.619	32.788	.000
TESTQ	32203.999	3	10734.666	20.323	.000
Error	197017.025	373	528.196		
Total	246591.000	377			
Corrected Total	229221.024	376			

a. R Squared = .140 (Adjusted R Squared = .134)

Multiple Comparisons

Dependent Variable: Difference Score MCAT and Estimated Percent Score

Bonferroni

(I) Quartile Group for Depression Knowledge Test Score	(J) Quartile Group for Depression Knowledge Test Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	6.51	3.344	.315	-2.36	15.37
	3	9.38*	3.352	.032	.49	18.27
	4	25.17*	3.352	.000	16.28	34.06
2	1	-6.51	3.344	.315	-15.37	2.36
	3	2.88	3.344	1.000	-5.99	11.75
	4	18.66*	3.344	.000	9.80	27.53
3	1	-9.38*	3.352	.032	-18.27	-.49
	2	-2.88	3.344	1.000	-11.75	5.99
	4	15.79*	3.352	.000	6.90	24.68
4	1	-25.17*	3.352	.000	-34.06	-16.28
	2	-18.66*	3.344	.000	-27.53	-9.80
	3	-15.79*	3.352	.000	-24.68	-6.90

Based on observed means.

The error term is Mean Square(Error) = 528.196.

*. The mean difference is significant at the 0.05 level.

APPENDIX E: REGRESSION ANALYSIS TESTING H1

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Raw Test Score[b]	.	Enter

a. Dependent Variable: Intention to Communication with Physician (ICB)

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.075[a]	.006	.003	.802

a. Predictors: (Constant), Raw Test Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.383	1	1.383	2.150	.143[b]
	Residual	241.343	375	.644		
	Total	242.727	376			

a. Dependent Variable: Intention to Communication with Physician (ICB)

b. Predictors: (Constant), Raw Test Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.524	.160		15.751	.000	2.209	2.839
	Raw Test Score	-.046	.031	-.075	-1.466	.143	-.107	.016

a. Dependent Variable: Intention to Communication with Physician (ICB)

APPENDIX F: REGRESSION OF LEVEL OF DEPRESSION KNOWLEDGE ON METACOGNITIVE ABILITY MEASURES TESTING H2.

Metacognitive ability: Estimated general depression knowledge

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Raw Test Score[b]	.	Enter

a. Dependent Variable: Estimated General Depression Knowledge (%)

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.026[a]	.001	-.002	23.182

a. Predictors: (Constant), Raw Test Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	134.116	1	134.116	.250	.618[b]
	Residual	201522.117	375	537.392		
	Total	201656.233	376			

a. Dependent Variable: Estimated General Depression Knowledge (%)

b. Predictors: (Constant), Raw Test Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	48.720	4.631		10.521	.000	39.615	57.825
	Raw Test Score	.449	.899	.026	.500	.618	-1.319	2.217

a. Dependent Variable: Estimated General Depression Knowledge (%)

Metacognitive ability: Estimated test-specific depression knowledge

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Raw Test Score[b]	.	Enter

a. Dependent Variable: Estimated Test Performance (%)

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.072[a]	.005	.002	22.239

a. Predictors: (Constant), Raw Test Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	955.962	1	955.962	1.933	.165[b]
	Residual	185468.972	375	494.584		
	Total	186424.934	376			

a. Dependent Variable: Estimated Test Performance (%)

b. Predictors: (Constant), Raw Test Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	45.943	4.442		10.342	.000	37.208	54.678
	Raw Test Score	1.199	.863	.072	1.390	.165	-.497	2.895

a. Dependent Variable: Estimated Test Performance (%)

Metacognitive ability: Estimated raw score depression knowledge

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Raw Test Score[b]	.	Enter

a. Dependent Variable: Estimates Raw Test Score (Out of 11)

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.017[a]	.000	-.002	2.095

a. Predictors: (Constant), Raw Test Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.468	1	.468	.107	.744[b]
	Residual	1645.903	375	4.389		
	Total	1646.371	376			

a. Dependent Variable: Estimates Raw Test Score (Out of 11)

b. Predictors: (Constant), Raw Test Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.051	.418		16.849	.000	6.228	7.874
	Raw Test Score	.027	.081	.017	.327	.744	-.133	.186

a. Dependent Variable: Estimates Raw Test Score (Out of 11)

APPENDIX G: TESTING H2. REGRESSION OF METACOGNITIVE ABILITY MEASURES TO INTENTION TO COMMUNICATE WITH PHYSICIAN

Metacognitive ability: Estimated general depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	MCAD[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.135[a]	.018	.016	1.37109

a. Predictors: (Constant), MCAD

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.151	1	13.151	6.996	.009[a]
	Residual	704.960	375	1.880		
	Total	718.111	376			

a. Predictors: (Constant), MCAD
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.676	.171		9.810	.000
	MCAD	.008	.003	.135	2.645	.009

a. Dependent Variable: First item of drug request - talk

Metacognitive ability: Estimated test-specific depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	MCAT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.144[a]	.021	.018	1.36938

a. Predictors: (Constant), MCAT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.906	1	14.906	7.949	.005[a]
	Residual	703.206	375	1.875		
	Total	718.111	376			

a. Predictors: (Constant), MCAT
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.623	.179		9.064	.000
	MCAT	.009	.003	.144	2.819	.005

a. Dependent Variable: First item of drug request - talk

Metacognitive ability: Estimated raw score depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	MCAR[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.160[a]	.026	.023	1.36600

a. Predictors: (Constant), MCAR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.381	1	18.381	9.851	.002[a]
	Residual	699.730	375	1.866		
	Total	718.111	376			

a. Predictors: (Constant), MCAR
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.329	.252		5.275	.000
	MCAR	.106	.034	.160	3.139	.002

a. Dependent Variable: First item of drug request - talk

APPENDIX H: MULTIPLE REGRESSION OF MODEL INCLUDING DTCA INTERVENTION TESTING H3.

Metacognitive ability: Estimated general depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	View DTCA or not, MCAD	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.136[a]	.018	.013	1.37283

a. Predictors: (Constant), View DTCA or not, MCAD

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.248	2	6.624	3.515	.031[a]
	Residual	704.864	374	1.885		
	Total	718.111	376			

a. Predictors: (Constant), View DTCA or not, MCAD
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.661	.183		9.077	.000
	MCAD	.008	.003	.135	2.639	.009
	View DTCA or not	.032	.142	.012	.227	.821

a. Dependent Variable: First item of drug request - talk

Metacognitive ability: Estimated test-specific depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	MCAT, View DTCA or not	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.144[a]	.021	.016	1.37113

a. Predictors: (Constant), MCAT, View DTCA or not

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.994	2	7.497	3.988	.019[a]
	Residual	703.117	374	1.880		
	Total	718.111	376			

a. Predictors: (Constant), MCAT, View DTCA or not
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.609	.191		8.446	.000
	View DTCA or not	.031	.141	.011	.217	.828
	MCAT	.009	.003	.144	2.812	.005

a. Dependent Variable: First item of drug request - talk

Metacognitive ability: Estimated raw score depression knowledge

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	MCAR, View DTCA or not	.	Enter

a. All requested variables entered.
b. Dependent Variable: First item of drug request - talk

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.160[a]	.026	.020	1.36782

a. Predictors: (Constant), MCAR, View DTCA or not

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.382	2	9.191	4.912	.008[a]
	Residual	699.730	374	1.871		
	Total	718.111	376			

a. Predictors: (Constant), MCAR, View DTCA or not
b. Dependent Variable: First item of drug request - talk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.328	.257		5.172	.000
	View DTCA or not	.002	.142	.001	.015	.988
	MCAR	.106	.034	.160	3.124	.002

a. Dependent Variable: First item of drug request - talk